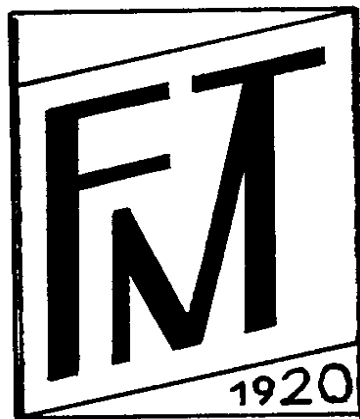


FACULTY OF MECHANICAL ENGINEERING



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CENTRE FOR MODELLING THE PROSTHETIC APPLIANCES AND SURGICAL OPERATIONS ON THE HUMAN SKELETON – *CMPICSU*

GENERAL PRESENTATION

The *Centre for Modelling the Prosthetic Appliances and Surgical Operations on Human Skeleton* is structured as a Multiple User Research Centre (MURC). The MURC connections in Timișoara are: “Politehnica” University, the University of Medicine and Pharmacy, the Municipal Hospital of Oro-Maxillo-Facial Surgery, the Departmental Hospital of Traumatology and Orthopedy.

The centre also supports the *Medical Engineering* specialization within the framework of the Faculty of Mechanical Engineering, in order to provide the training of engineers to design: prosthesis, implants, correcting equipment and specialized software for medical applications.

MISSION

The Multiple User Research Centre *Centre for Modelling the Prosthetic Appliances and Surgical Operations on Human Skeleton* CMPICSU has been created in order to integrate the scientific research results from different universities and hospitals from our country in fields like: *acquisition and image processing, biomechanics, implant designing and manufacturing, repairing surgical techniques*. Thus, the CMPICSU MURC represents a connecting factor, oriented towards interdisciplinary research and education. Also, CMPICSU centre offers medical imaging investigations for regular patients. The CMPICSU’s recent extensions are two laboratories: LOPIFO for implants and prosthetic devices manufacturing and CIDUCOS for control the quality of materials (metals, plastic and ceramics, etc) generally biocompatibles, focused on implants and prosthetic devices. The last one is under way to be accredited conformably to SR EN ISO/CEI 17025 norm.

RESEARCH FIELDS

- Fundamental and applied research in Biomechanics;
- Image acquisition and processing in order to correct congenital or accidental defects of human skeleton;
- Research on prosthetic appliances and implants optimization depending on skeleton defects;
- Complex data basis for different categories of skeleton defects and repairing surgical techniques;

- Conceiving of new surgical techniques;
- New technologies to manufacture surgical implants and prosthetic devices;
- New testing methods designed for various materials but focused on implants and prosthetic devices.

KEYWORDS

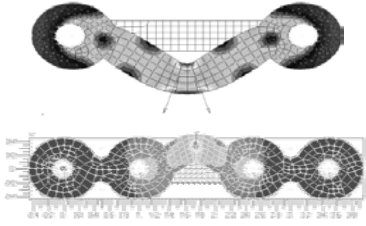
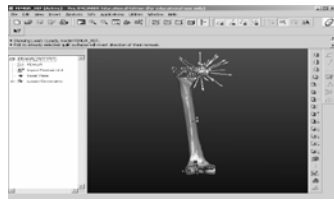
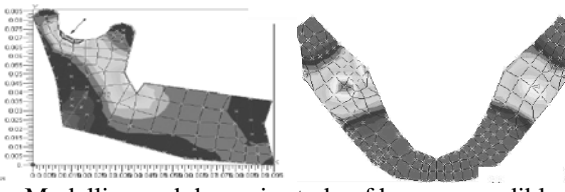

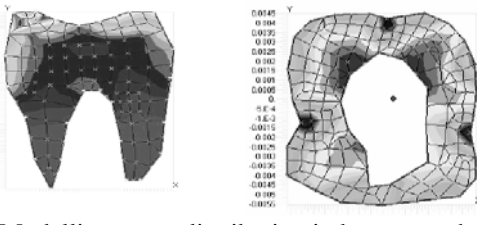
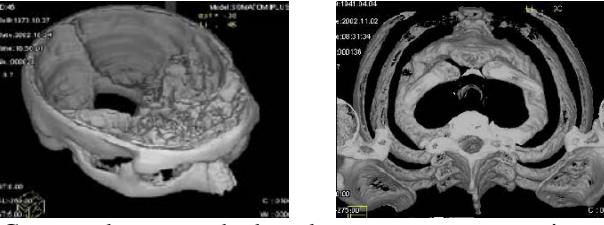
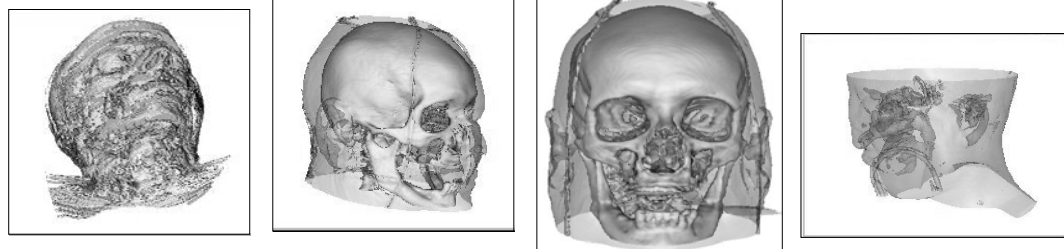
Medical imaging, implant, prosthesis, mandibular distractor, surgical technique, biocompatible material, biological structure modelling, 3D reconstruction

ACTIVITIES

- *Image processing and interpretation* in order to correct congenital or accidental defects of the human skeleton;
- *Prosthetic appliances and implants optimization* as function of skeleton defects;
- *Complex data basis for different categories of skeleton defects and the repairing surgical techniques*;
- *New surgical techniques* to improve the skeleton structure and the sustaining demo operations;
- Development of appropriate technologies to *realize implants and prosthesis using biocompatible materials*.
- Manufacturing of *implants and external distractors for maxillo-facial surgery*, using biocompatible materials, in the LOPIFO Laboratory;
- *Implementation of quality system* in the CIDUCOS Testing Laboratory;
- *Promoting collaboration* in related fields with universities and research institutes;
- *Promoting the Medical Engineering Specialization* in the “Politehnica” University of Timișoara

RESEARCH RESULTS

- Biological structures reconstruction based on computed tomography;
- FE analysis of human mandible, teeth, femur/tibia and spine;
- FE analysis of facial implants;
- Manufacture facial implants.

 <p>Modelling implants using finite elements method</p>	 <p>Modelling the human femur using finite elements method and Pro/Engineer</p>
 <p>Modelling and dynamic study of human mandible</p>	 <p>Artificial mandible</p>
 <p>Modelling stress distribution in human teeth</p>	 <p>Computed tomography based structures reconstructions</p>
 <p>3D reconstruction software</p>	

CMPICSU laboratories

1. *Laboratory of structures modelling*: professional software for design of both prosthetic devices, implants and surgical operations;
2. *Motion planning laboratory*: 5 mobile robot systems;
3. *Laboratory of medical images acquisition*: computer tomography system and ortho-panoramic X-ray apparatus are installed;
4. *Laboratory for production implant devices, orthoses and prosthetic devices LOPIFO*: equipment to manufacturing prosthetic devices;
5. *Laboratory to control the quality of surgical implants and prosthetic devices CIDUCOS*: conformably to UE ISO 9001-17025 system;

RESEARCH CONTRACTS



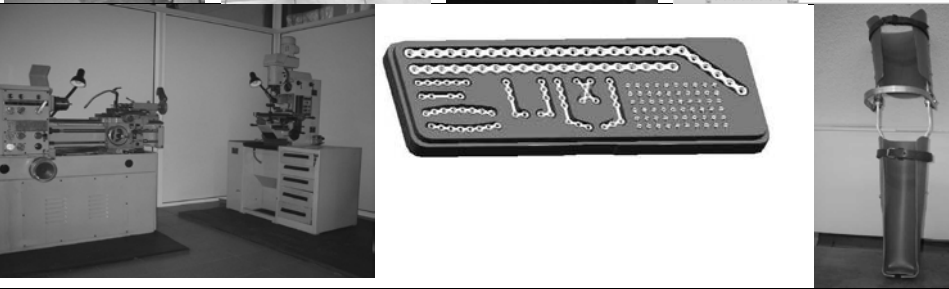
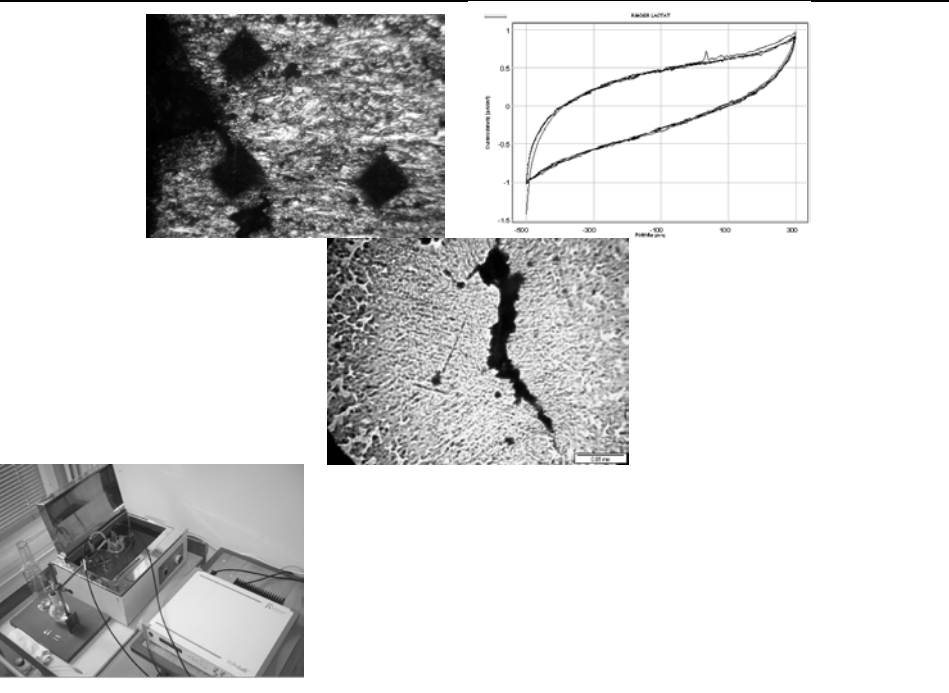
1. Contract 27688/14.03.2005, code 655, Director prof. dr. eng. Doina Drăgulescu, *Autonomous prehension system to support handicapped persons and access in dangerous areas*
Beneficiary: Ministry of Education and Research, value 15,000 RON
2. Contract CEEEx-RENAR no. 28/7.09.2005, Director prof. dr. eng. Doina Drăgulescu, *Extension and development of CIDUCOS laboratory capacity under way to be accredited by RENAR conformably to conform SR EN ISO/CEI 17025:2001-EDCL_CIDUCOS*. Beneficiary: Ministry of Education and Research, value 660,000 RON
3. Contract CEEEx-Medical Sciences Academy no.45/2005, Director prof. dr. eng. Doina Drăgulescu, *Development of innovative therapies for osteoarticular reconstruction CELL-ART*. Beneficiary: Ministry of Education and Research, value 170,000 RON
4. Contract PNCDI / BIOTECH, 02-6-PA-346 / 2002, Director prof. dr. eng. Doina Drăgulescu, *Contributions to the population's state of*

health improvement by producing of prosthetic devices, surgical instrumentation and implant's cases for skeletal deficiencies recovery.
Beneficiary: Ministry of Education and Research, value for 2005: 109,127 RON

- Contract PNCDI / INFRAS, Nr. 187 / 06.11.2003, Director prof. dr. eng. Doina Drăgulescu, *Laboratory for certifying the mandibular implants and distractors used in maxillo-facial surgery – CIDUCOS.*

Beneficiary: Ministry of Education and Research, value for 2005: 120,777 RON

- Contract PNCDI / VIASAN, Nr. 313/2004, Director prof. dr. eng. Doina Drăgulescu, *Developing nonconventional medical techniques for optimizing the growth of cultivated live tissues in bioengineering.*
Beneficiary: Ministry of Education and Research, value for 2005: 10,500 RON

<p>Laboratory for medical imaging</p>	
<p>Laboratory of modelling and design</p>	
<p>Laboratory for implants and prosthetic devices manufacturing LOPIFO</p>	
<p>Laboratory for control the quality of implant devices CIDUCOS</p>	

PUBLICATIONS

BOOKS

1. Doina Drăgulescu, *Mécanique générale et applications*, Ed. L'Harmattan, 2005, Paris, ISBN 2-7475-9036-4, ean 9782747590365, 270 pages
2. Doina Drăgulescu, *Modeling in Biomechanics*, Editura Didactică și Pedagogică Publishing House, 2005, ISBN 973-30-5870-X, 328 pages

PAPERS IN JOURNALS

1. Drăgulescu, D., Dreucean, M., Toth-Tașcău, M., *Adaptive control of mobile transfer systems based on the theory of subjective probabilities*, Annual Proceedings of the Technical University in Varna, Bulgaria, 5-312, 2005, Publisher High-technology park, TU Varna Ltd., ISSN 1312-1839, pp. 59-63
2. Dreucean, M., Drăgulescu, D., Toth-Tașcău, M., *Deadlocks detection based on simulation with Petri nets*, Annual Proceedings of the Technical University in Varna, Bulgaria, 5-312, 2005, Publisher High-technology park, TU Varna Ltd., ISSN 1312-1839, pp. 64-67
3. Drăgulescu, D., Demian, C., Nica-Belu, R., Berger, E., *Problèmes posés par le comportement à la corrosion des matériaux composites métalliques (MCM) ayant la matrice en a lliages d'aluminium*, Annals of the Oradea University, Fasc. of Management and Technological Engineering, vol. IV (XIV), 2005, ISSN 1583-069, pp. 98-104
4. Drăgulescu, D., *Titanium dental and surgical implants*, Timișoara Medical Journal, Vol. 55, 2005, suppl. No.6, ISSN 0493-3079, pp. 67-68
5. Drăgulescu, D., Ungureanu, L., *Modelling the human hand as automatic system*, Scientific Bulletin of the „Politehnica” University of Timișoara, Transactions on Mechanics-special issue, Tom 50(64), 2005, ISSN 1224-6077, pp. 23-28
6. Drăgulescu, D., Morcovescu, V., Toth-Tașcău, M., *The influence of external motions on the human lower limb's motion*, Scientific Bulletin of the “Politehnica” University of Timișoara, Transactions on Mechanics-special issue, Tom 50(64), 2005, ISSN 1224-6077, pp. 19-22
7. Drăgulescu, D., Ungureanu, L., *Human hand modelling*, Bulletin of the Polytechnic Institute Iași, Tom LI (LIV), Constr. de mașini, supl. 2005, pp. 365-372
8. Drăgulescu, D., Stanciu, A., Ungureanu, L., Răduță, A., *Custom design facial implants made using an original rapid prototyping tool*, Proc. 28th International Spring Seminar on Electronics Technology, IEEE - ISSE 2005, May 19-22, 2005, Wien, Austria, IEEE Catalog Number 05EX1142C, ISBN 0-7803-9325-2, pp. 83-88
9. Drăgulescu, D., Stoicănescu, C., Crețu, A.M., Toth-Tașcău, M., Dreucean, M., *Utilitarian robots acting in a virtual medical center scene* IEEE - IMTC 2005 - Instrumentation and Measurement Technology Conference, Ottawa, Canada, May 17-19, 2005, ISBN 0-7803-8879, pp. 1373-1377
10. Stănciulescu, V., Albu, A., Drăgulescu, D., *3D Reconstruction method for the head skeleton*, Proceedings SACI 2005, 2nd Romanian-Hungarian Joint Symposium on Applied Computational Intelligence, Timișoara, Romania, May 12-14, 2005, ISBN 963 7154 39 6, pp. 59-64
11. Ungureanu, L., Drăgulescu, D., *Modeling a human finger as an automatic system*, Proceedings SACI 2005, 2nd Romanian-Hungarian Joint Symposium on Applied Computational Intelligence, Timișoara, Romania, May 12-14, 2005, ISBN 963 7154 39 6, pp. 69-76
12. Drăgulescu, D., Rusu, L., Stanciu, A., Ungureanu, L., Albu, A., *Numerical analysis of LN 331 S plate stress and deformation in cranial fixation*, Proceedings SACI 2005, 2nd Romanian-Hungarian Joint Symposium on Applied Computational Intelligence, Timișoara, Romania, May 12-14, 2005, ISBN 963 7154 39 6, pp. 77-84
13. Drăgulescu, D., Ungureanu, L., Stanciu, A., *Modeling the motion of the human middle finger*, Proceedings SACI 2005, 2nd Romanian-Hungarian Joint Symposium on Applied Computational Intelligence, Timișoara, Romania, May 12-14, 2005, ISBN 963 7154 39 6, pp. 99-106
14. Drăgulescu, D., Rusu, L., Botnarașec, N., Voicu, A., *The influence of bone demineralization on spinal column during pregnancy*, Proceedings of VIth National Symposium on Biomaterials, *Biomateriale și Aplicații Medico-Chirurgicale*, Iași, October 28-29, 2005, ISBN 973-627-237-0, pp. 85-86
15. Drăgulescu, D., Rusu, L., Dreucean, M., Toth-Tașcău, M., *Stress and deformation analysis indexed in mandible by dental implants*, Proceedings of VIth National Symposium on Biomaterials, *Biomateriale și Aplicații Medico-Chirurgicale*, Iași, October 28-29, 2005, ISBN 973-627-237-0, pp. 37-38

PhD THESIS

- Naaji Antoanela Luciana: *Contributions to modelling techniques of the human upper limb*, scientific coordinator prof. dr. eng. Doina Drăgulescu, January 2005
- Morcovescu Vlad: *Modelling the human lower limb towards redemption by using prosthetic devices*, scientific coordinator prof. dr. eng. Doina Drăgulescu, June 2005

PhD STUDENTS

Scientific coordinator prof. dr. eng. Doina Drăgulescu:

- Rusu Lucian: *Studies and tests of implants and prosthetic devices in against homologation*
- Demian Camelia: *Researches about behavior of materials designed to realize bones implants conformably European quality standards*
- Voicu Adrian: *Biocompatibility study between surgical implants in Titanium alloys and human body*
- Menyhardt Karoly: *Intelligent prosthetic system for human upper limb*
- Stoia Dan Ioan: *About modeling and setting the appropriate technology for spinal implants*
- Reguş Nicoleta: *Contributions on the study of surgical implants to fix the long bones fractures*
- Dragomir Lavinia; *Contributions to mathematical modeling of spaces with obstacles to plan the motion*
- Belu Nica Remus: *Considerations about welding technologies of thin plates in metallic composite*
- Cărăbaş Ionică: *Biomechanical study of characteristic motions in running during athletic proofs and handball*
- Albu Adriana Nicoleta: *About expert systems for the diagnose of liver diseases*
- Şimon Andreea Anca: *Contributions to the conceiving of a virtual mannequin to model fashion clothes*

- Gherghel Daniela: *Contribution to prosthetic replacing of mechanical functions of human upper limb*
- Bianu Arcadie: *Biomechanical studies for improving physical performances of sport-beginners*
- Stefan Vigaru Cosmina: *Theoretical and experimental studies about noise sources and levels produced by some types of looms*
- Ungureanu Loredana: *Models of human hand rebuilding and its functions*

PERSPECTIVES

- Manufacturing new implants models and prosthetic devices in order to be certified conformably to European standards;
- Motion analyzes for lower and upper limb;
- Extention of testing methods for medical devices;
- Further research in the field of 3D reconstruction of human body elements.

RESEARCH TEAM

- Prof.dr.eng. Doina Drăgulescu – Director
- Prof.dr.eng. Mirela Toth-Taşcău
- Assoc.prof.dr.eng. Mircea Dreucean
- Assist.dr.eng. Vlad Morcovescu
- Assist.eng. Cosmina Vigaru, PhD student
- Eng. Lucian Rusu, PhD student
- Eng. Camelia Demian, PhD student
- Eng. Adrian Voicu, PhD student
- Eng. Karoly Menyhardt, PhD student
- Eng. Ioan Dan Stoia, PhD student
- Dr. Botnaraşec Nicoleta, PhD student
- CMPICUSU partners in Timișoara, Bucureşti, Cluj-Napoca, Craiova.

CONTACT

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NATIONAL CENTER FOR ENGINEERING OF SYSTEMS WITH COMPLEX FLUIDS – NCESCF

GENERAL PRESENTATION

The *National Center for Engineering of Systems with Complex Fluids (NCECF)* is structured as a Multiple User Research Centre (MURC). Its research team joins professors and researchers from “Politehnica” University from Timișoara, Romanian Academy – Timișoara Branch, and Politehnica University from Bucharest, and the research facilities are used in association with scientists from leading Universities and Research Institutes from Romania, as well as from Germany, France, Hungary, U.S.A.

The NCECF also supports educational activities for master and PhD programs in mechanical engineering and computer science, as well as the Microsoft Academic Program within the “Politehnica” University of Timișoara.

HISTORY

- In 1997 was started the first pilot program financed by WORLD BANK (25000 USD) to set up the basic centre infrastructure;
- The main grant (317000USD) was finished in 2002, with the set up of the research infrastructure for the three main laboratories: magnetometry, rheology, and numerical simulation;
- A partnership with Microsoft Company allowed the continuous development and upgrade of the software infrastructure

MISSION

The *National Center for Engineering of Systems with Complex Fluids (NCECF)* main goal is to support high level research and education in the domain of complex fluids characterization, production, and application developments. Our three decades experience in producing magnetic liquids and developing engineering applications, as well as in cavitating flow theoretical and applicative studies, allows us to coordinate and support research programs in magnetometry, rheology and magnetorheology of multiphase fluids, nano-fluids, various polymers, as well as on complex hydrodynamic problems in hydraulic machines, hydromechanic equipments, biomedical applications. Our experimental and computational capabilities are able to support top level PhD research programs, as well as international scientific cooperations.

RESEARCH FIELDS

- Flow properties of magnetic nanofluids and composites, magnetorheological fluids, polymeric melts, emulsions, gels;
- Magnetic and magnetorheological properties of magnetizable complex fluids;
- Specially tailored magnetic fluids as cooling agents: nucleate boiling heat transfer under the influence of a magnetic field;
- Magnetic and rheological characterization of bio-compatible/bioactive magnetizable fluids, ointments, composites for applications in plant biology and veterinary medicine;
- Magnetizable nanocomposite polymers with micrometric reinforcement elements;
- Engineering applications: rotating seals for high vacuum and moderate pressures, inductive sensors, MRF dampers;
- Mathematical and numerical modelling of complex fluid hydrodynamics, including fluids with complex rheology, two-phase cavitating flows, turbulent 3D flows in complex geometries;
- Mathematical and numerical modelling of the swirling flows as well as its practical applications;
- Analysis and optimization of hydraulic turbomachines, for both energetical and cavitation aspects;
- Development of research and professional software for parallel computing with applications in engineering hydrodynamics, turbomachineries, hydromechanical equipment.

KEYWORDS

Complex fluids, magnetic nanofluids, magnetorheological fluids, magnetizable nanocomposites, magnetic properties, rheological properties, numerical hydrodynamics, cavitation, hydraulic turbomachines, parallel computing.

ACTIVITIES

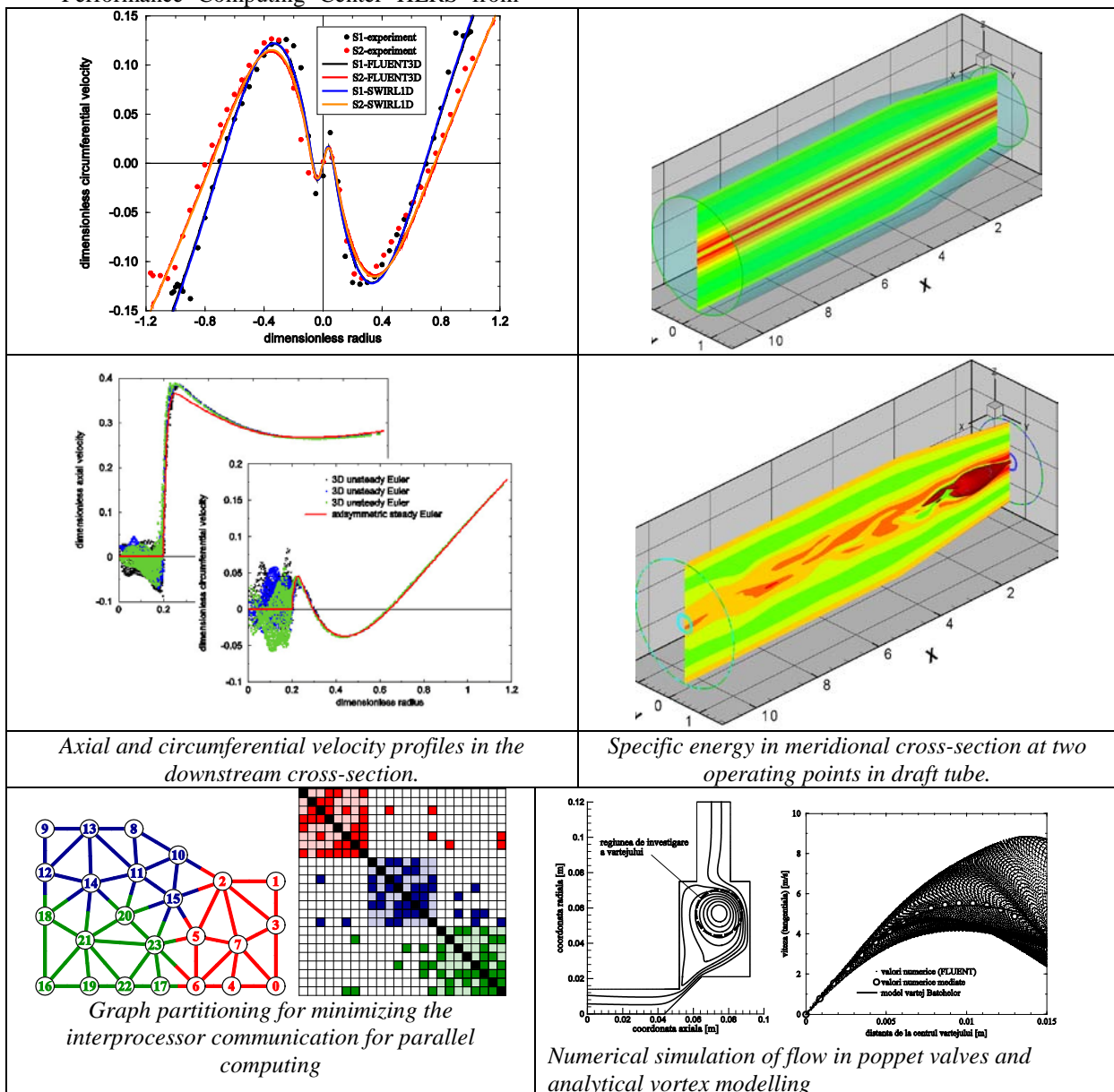
- *Complex characterization* of magnetic nanofluids and composites, magnetorheological fluids, polymeric melts, emulsions, gels: oscillatory and rotational rheometry, magnetometry;
- *Research and production* of new magnetic nano-fluids, magnetorheological fluids;
- *Application development* using magnetic fluids, in aerospace and bio-medical projects;

- Numerical simulation of flows with complex rheology and/or complex geometries, cavitating flows, applications for turbomachinery analysis and optimizations.
- Software development customized for special engineering applications;
- Educational activities in mechanical engineering and computer science, including master and PhD programs.
- Prof.dr.eng. Romeo Susan-Resiga - Invited Professor at the Ecole Polytechnique Federale de Lausanne, for the period Aprilie-May 2005.
- Dr.eng. Sebastian Muntean won at **HPC-EUROPA Transnational Access Program** the project entitled *High Performance Computing for 3D Unsteady Swirling Flow Simulation in Draft Tube* contract nr. 506079 during January 24 – March 31 at Institute of Fluid Mechanics and Hydraulic Machinery (IHS) and High Performance Computing Center HLRS from

Stuttgart University. The goals of the project were to evaluate the numerical models to compute the swirling flows.

RESEARCH RESULTS

- Full three-dimensional flow simulation in Kaplan hydraulic turbines;
- Parallel computing algorithms, development and implementation;
- Simulation and analytical modelling of flows in hydraulic poppet valves;
- Advanced characterization methods of the flow and magnetic behaviour of complex fluids and nanocomposites;
- High performance multifunctional materials for magnetically controlled heat transfer processes;
- Rotating seals, sensors, semiactive dampers;
- Biomedical applications.

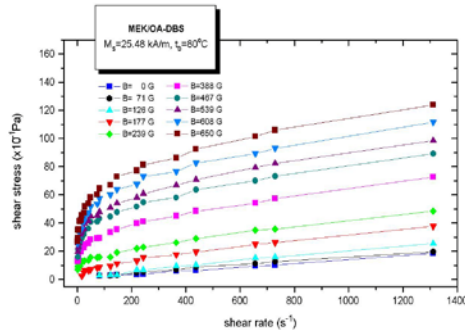


Axial and circumferential velocity profiles in the downstream cross-section.

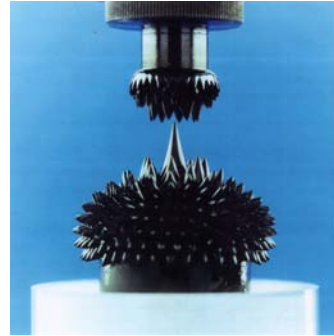
Specific energy in meridional cross-section at two operating points in draft tube.

Graph partitioning for minimizing the interprocessor communication for parallel computing

Numerical simulation of flow in poppet valves and analytical vortex modelling



Magnetic field induced non-Newtonian flow behaviour of a strongly polar magnetic nanofluid



Surface instabilities

Magnetometry Laboratory

- VSM 880 magnetometer
- the DMS Vibrating Sample Magnetometer (VSM) is a computer-controlled measurement system capable of characterizing a wide variety of magnetic samples
- The VSM supports all known magnetic measurements such as Hysteresis and Minor Loops, IRM and DCD Remanence Loops, SFD, Delta M and Henkel Plots, and Angular and AC Remanence Loops. Any series of measurements can be run without user intervention, using the flexible *EasyVSM* software.



Rheology Laboratory

The PHYSICA MCR 300 rheometer performs a wide range of steady and dynamic tests in both CSS and CSR mode. It covers a wide range of applications, from generating simple flow curves to the dynamic analysis of complex fluids, melts, and co-polymers:

Shear stress (CSS), Creep and recovery, Normal force, Stress relaxation, Linear tensile and compression, Amplitude sweep, Frequency sweep, Temperature sweep, Time sweep, Multiwave, Oscillation with superimposed rotation or any combination of the above. Our rheometer has additional magnetorheological capabilities, as well as a wide range of temperature settings (up to 300 Celsius).



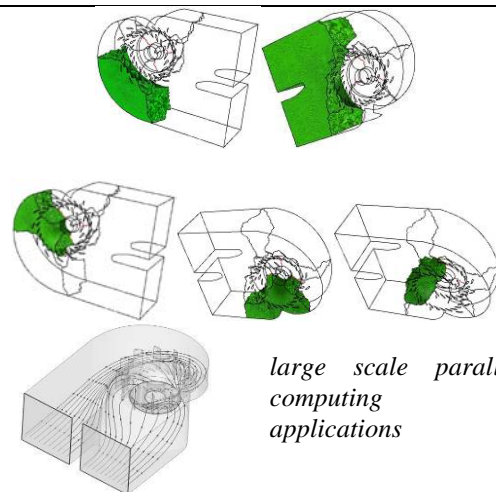
Numerical Simulation and Parallel Computing Laboratory

Hardware infrastructure:

- 14 workstations computer cluster 4 Statii de lucru, PIII, 1 GHz, memorie 1 GB RAM
- IBM X225 Windows server
- Dual PIII, 2GB RAM Linux server
- DELL Precision workstation, 2 INTEL XEON 3 GHz, 4 GB RAM.

Software infrastructure

- FLUENT/FIDAP/POLYFLOW suite for a wide range of numerical flow simulations; available for parallel computing
- TECPLOT for advanced data post-processing
- Software for developing parallel computing applications.



large scale parallel computing applications

RESEARCH CONTRACTS

1. Susan-Resiga, R., (director), *Vortex Hydrodynamics and Applications*, Consortium grant CNC SIS 33, Contract 27688/14.03.2005, Value: 200.000 RON
2. **JINR Dubna, Russia:** *Preparation and characterization ferrofluid samples for experiments of small angle neutron scattering (SANS)*. Project in partnership with INCDTIM Cluj-Napoca (coordinator) and INFLPR-ISS Bucuresti, Ctr. nr.: 457/01.09.2005, Value for 2005: 5.100 \$, Responsible of project Dr. Ladislau VÉKÁS
3. Muntean, S., Bernad, S., Anton, I., *Using the Modern Methods for Numerical Simulation and Analysis of Tridimesnional Flow in Hydraulic Turbines with Practical Application at Francis and Kaplan Turbines*, Grant CNC SIS A-Consorțiu 33/2005, Value: 17.000 RON
4. Bernad, S., Resiga, R., Muntean, S., Balint, D., Stuparu, A., *Numerical Modelling and Analysis of the Cavitating Two-Phase Flows in Hydraulic Turbines*, Grant CNC SIS A 738/2005, Value: 15.000 RON
5. *Nanostructured hybrid systems based on conducting polymers, magnetic nanoparticles and carbon nanotubes (NANOCOMPOLI)*, Program CERES, ctr. nr. 4-139/12.11.2004, Period: 2004-2006, Value for 2005: 4.000 RON (Partnership with INCDTIM Cluj-Napoca). Responsibilities: Assoc.prof. Floriana D. Stoian, PhD
6. *Absorbtion of electromagnetic radiation in nanofluids with applications in cancer chemotherapy (AREFIN)*, Program CERES, ctr. nr. 4-186/04.11.2004, Period: 2004-2006, Value for 2005: 4.000 RON (Partnership with IFIN-HH Bucharest, Responsible: Dr. Ladislau Vékás
7. *Investigation by magneto-optical methods of the structure of concentrated magnetic fluids*, Program CERES, ctr. nr. 3-116/14.11.2003, Period: 2003-2005, Value for 2005: 13.600 RON (Partnership with INCEMC-ICMC Timișoara), Responsible: Dipl.-Phys. Oana Marinica
8. *Magnetically controllable transporters of medical/active substances (TRAMAG)*, Program AEROSPAȚIAL, ctr. nr. 173/01.11.2004, Period: 2004-2006, Value for 2005: 15.000 RON, Partnership with ISS Bucharest, Responsible: Dipl.-Phys. Oana Marinica
9. *Researches on the construction of adaptive mirrors with magnetizable complex fluids, with application to space telescopes (OALM)*, Program AEROSPAȚIAL, ctr. nr. 111/01.10.2004, Period: 2004-2006, Value for 2005: 12.000 RON, Partnership with INFLPR Bucharest, Responsible: Dipl.-Phys. Oana Marinica
10. *Researches on the genetic and epigenetic activity procariote and eucariote biological systems in simulated hypogravity conditions, in the presence of magnetic nanoparticles and UV radiation (HIPOUV)*, Program AEROSPAȚIAL, ctr. nr. 114/02.11.2004, Period: 2004-2006, Value for 2005: 4.000 RON, Partnership with USAB Timisoara, Responsible: Dipl.-Phys. Oana Marinica
11. *Advanced autonomous systems for the control of oscillating structures (SACOS)*, Program CEEEX, ctr. nr. 51/03.10.2005, Period: 2005-2007, Value for 2005: 80.000 RON, Partnership with UTC Bucharest, Responsible: Dr. Ladislau Vékás

PUBLICATIONS**BOOKS**

1. Sandor Bernad, *Hydrodynamic of the adjustment equipment for hydraulic drives*, (published in Romanian), Orizonturi Universitare Publishing House, 2005, ISBN 973-638-249-4, 224 pages
2. Bernad, S., Muntean, S., Susan-Resiga, R., (Editors), *Proceedings of the Workshop on Vortex Dominated Flows Achievements and Open Problems*, Tom 50(64) Special Issue, 2005, ISSN 1224-6077, 210 pages

JOURNAL PAPERS

1. Bernad, S.I., Bernad, E., Mihalas, G., *Geometry influence of the unsteady flow through the arterial stenosis*, in Studies in Health Technology and Informatics, vol 95, Connecting Medical Informatics and Bioinformatics, Editors: R. Baund, M. Fieschi, P. Le Beux, P. Ruch, IOS Press Amsterdam, 2005, ISSN 0926-9630, pp. 575-582
2. Balint, D., Resiga, R., Muntean, S., *Automated algorithms for computing the full 3D turbulent flows in Kaplan turbines*, Proceedings of the Southeastern Europe FLUENT Event 2005, May 11-13, Porto Carras Grand Resort, Halkidiki, Greece, 2005 (on CD-ROM), 9 pages
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4. Bernad, S.I., Bernad, E., Resiga, R., Muntean, S., *Unsteady flow simulation in the arterial stenosis*, Proceedings of the Southeastern Europe FLUENT Event 2005, May 11-13, Porto Carras Grand Resort, Halkidiki, Greece (on CD-ROM), 10 pages
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3. Balint, D., Bernad, S., Muntean, S., Resiga, R., *Numerical simulation and analysis of cavitating flow in hydraulic machines*, Proceedings of the Joint Meeting Timisoara-Stuttgart on *Turbomachinery Hydrodynamics*, Nov. 23-27, 2005, Timisoara, Romania, extended abstract 5 pages, pp. 86
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PERSPECTIVES

- Development of new nano-fluid materials and magneto-rheological suspensions, with aerospace and bio-medical applications;
- Development of new numerical simulation techniques for complex 3D cavitating flows.

RESEARCH TEAM

- Prof.dr.eng. Romeo SUSAN-RESIGA, Director
- Dr.phys. Ladislau VEKAS, Scientific Director, head of the Rheology Laboratory
- Dr.eng. Sandor BERNAD, Executive Director

- Dr.eng. Sebastian MUNTEAN, head of the Numerical Simulation Laboratory
- Assoc.prof.dr.eng. Floriana STOIAN, head of the Magnetometry Laboratory

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HYDROPNEUMATIC MACHINES AND SYSTEMS RESEARCH CENTRE

GENERAL PRESENTATION

The Research Center was established around a strong material base and an experienced and dedicated staff. The Research Centre has, also, benefits from the Hydraulic Machinery Laboratory of the "Politehnica" University of Timișoara, laboratory build in 1929 and was – and still is – a strong basis in creating conditions to develop research and support didactic experiments in order to offer practical habits to students.

The centre was founded by the Department of Hydraulic Machinery, the Research Centre for Aero-energetics, the National Centre for Engineering of Systems with Complex Fluids, the Hydrodynamics Cavitation and Magnetic Liquids Centre. It has been accredited by CNCISIS as a research centre, type C, with the certificate no. 56/CC.

Besides the experimental facilities, the Hydraulic Machinery Department has five computer networks, one of them direct connected to some facilities. Those networks assure a modern didactic process and creation and use of powerful software numeric methods in turbomachinery field.

The mission of the centre is to realize experimental research in turbomachinery and hydraulic drives systems field in correlation with numerical analysis, using adequate software.

MAIN ACTIVITIES

Research domains:

- Machines and hydro-pneumatic equipment
- Turbomachinery hydrodynamics and cavitation
- Drive systems and automation.

Keywords: *hydro-turbines, turbo-pumps, hydrodynamics, cavitation, hydraulic drives, numerical methods*

Areas of expertise:

- Elaboration of computational methods in hydrodynamics of turbomachinery and hydraulic equipment and development of software bases for intelligent machines and installations
- Elaboration of numeric methods to simulate the flow in turbomachines, cascades and development of complex models to determine the universal characteristics of cascades and turbomachines
- Elaboration of constructive solutions for turbines and micro-turbines and research and design of turbomachines
- Optimization of hydraulic machinery by using numerical methods
- Static and dynamic identification and study of transients in pumps and turbines
- Analyze of aero-energetic potential of western Romania and particular the Banat Mountains
- Researches in aero-energetical offer of a zone for an aero-electric farm
- Hydrodynamics of cavitation in turbomachinery with application to Francis and Kaplan turbines
- Researches in the domain of cavitation resistance of materials used for hydraulic turbines
- Follow - up the exploitation cavitational behavior of hydraulic machinery and hydraulic drives
- Design the hydraulic drives systems for several industrial applications
- Modular optimization of the structures and elements of hydraulic drives systems
- Modeling the flow in hydraulic drives and analyze their static and dynamic behavior

- Experimental tests on standard and proportional hydraulic equipment, using automated acquisition of experimental data
- Assisted study and design of hydraulic drives systems.

RESULTS

RESEARCH CONTRACTS

1. CNCISIS 154, theme A4, contract no. 32940 / 22.06.2004, continue 2005, *Investigations upon deformations and cracks produced as a result of cavitation erosion to the austenitic stainless steel used for casting hydraulic turbines blades*, Director: Assoc. prof.dr.eng. Ilare Bordeasu, value: 20.000 RON
2. CNCISIS 145, theme A3, contract no. 32940 / 22.06.2004, continue 2005, *Theoretical and experimental investigations regarding the hydro-mechanical equipments for driving and power system*, Director: Prof.dr.eng. Victor Bălăsoiu, value: 27.450 RON
3. CNCISIS 601, theme A3, 2005: *Theoretical and experimental investigations about turbomachines operation with two-phase flow applied to hydrodynamic transmissions*, Director: Prof.dr.eng. Mircea Barglazan, value: 15.000 RON
4. Research Contract No. 213/20.01.2005, Beneficiary: RECONT Romania, *Numerical Analysis at off-design operating points of RECONT Francis turbine n_s_kw=285*, Director: Assist.dr.eng. Balint Daniel, Value: 2.500 RON

BOOKS

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Turbine Using the Thermodynamic Method, Sustainability for Humanity & Environment in the Extended Connection Field Science-Economy-Policy, Timișoara, 2005, vol. 2, ISBN 973-625-204-3, pp. 187-190

12. Stuparu, A., Baya, A., Anton, L.E., *Thermodynamic Method for Pumps Efficiency Monitoring and Flow Rate Estimation, and Application to a Multistage Pump*, Proceedings of the "Conference for Young Professionals: Innovations in the Field of Water Supply, Sanitation and Water Quality Management", Bucharest, 2005, ISBN 973-0-03972-0, pp. 175-180
13. Bălășoiu, V., Popoviciu, M., Bordeasu, I., *Mathematical model of the assembly cylinder-load for linear motor (Part I)*, International Conference on Energy and Environment, Bucharest, 2005, Section S3, ISBN 973-86948-5-x, pp. S3.13-S3.18
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15. Dobândă, E., *Transformări geometrice utilizate în studiul turbomașinilor*, Five National Conference with International Participation «Professor Dorin Pavel – Romanian Hydroenergetics Founder», Ed. AGIR, Bucharest, 2005, ISBN 973-8130-82-4, pp 85-88
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PERSPECTIVES

- Checking the micro-hydroelectric stations in situ; building dynamic models for Pelton turbines
- Determination of main parameters of tangential turbines using dynamic identification methods
- Building modern test facility to test the pumps and connect it to computer
- Using the grapho-analytical and numeric method in design turbines and pumps and experimental validation by comparing with experimental data
- Up - to - date hydraulic schemes of hydro-mechanic equipment by using logic elements and proportional components; optimization of hydraulic schemes for automation and synchronization of hydro-mechanic equipment
- Study of hydrodynamic phenomenon in hydraulic drives
- Study the influence of compressibility of oil on the dynamic of hydraulic drives systems
- Theoretical and numeric study of cavitation coefficients in hydraulic drives systems components
- Determination of cavitation behavior of different types of steel using both experimental and statistical methods
- Study of the influence of tiredness (fatigue) stresses on the cavitation characteristics of types of steel used for hydraulic turbines
- Study the microstructure transformations produced by cavitation in austenitic steels
- Use of numerical simulation of flow in reversible turbomachines
- Analyzis of the aero-energetic potential of Semenic by using statistic methods on the INMH databases
- Selection of adequate technologies to refurbish wind turbines of Semenic site

RESEARCH TEAM

- Acad. prof.dr.doc.eng. Ioan ANTON
- Prof.dr.eng. Iosif PREDA
- Prof.dr.eng. Francisc GYULAI
- Prof.dr.eng. Ioan FITERO
- Prof.dr.eng. Victor BĂLĂȘOIU
- Prof.dr.eng. Mircea BĂRGLĂZAN
- Prof.dr.eng. Liviu Eugen ANTON
- Prof.dr.eng. Alexandru BAYA
- Prof.dr.eng. Romeo RESIGA
- Assoc.prof.dr.eng. Teodor MILOȘ
- Assoc.prof.dr.eng. Ilare BORDEAȘU
- Lect.dr.eng. Adriana MANEA

- Lect.dr.eng. Eugen DOBÂNDĂ
- Lect.dr.eng. Corneliu VELESCU
- Lect.dr.eng. Adrian BEJ
- Lect.dr.eng. Dorin GALERIU
- Assist.eng. Ionel BACIU
- Assist.eng. Rodica BĂDĂRĂU
- Assist.eng. Liliana SUCITU
- Assist.eng. Ioan PĂDUREANU
- Assist.eng. Daniel BALINT
- Assist.eng. Adrian STUPARU

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RESEARCH CENTRE FOR VIBROIMPACTS AND MECHANICAL VIBRATIONS

GENERAL PRESENTATION

Because of the existing tradition due to the results obtained in research, the premises appeared for funding a centre of scientific excellence with preoccupations in the field of vibroimpacts and mechanical vibrations. As consequence of the competitions organized by CNCISIS, concerning the identification and evaluation of the research centers, the developed activity was specially appreciated, so the research centre was recognized. By the certificate no. 15/CC-B from 11/05/2001, it has been recognized as a **research centre**, type B: **VIBROIMPACTS AND MECHANICAL VIBRATIONS**. It has to be underlined that the research in the field of the vibroimpacts is done, with priority, by the collective from this centre.

The director of the Centre is PhD. Prof. Eng. **Liviu Brîndeu**, from the Department of Mechanics and Vibrations of the Faculty of Mechanical Engineering.

MISSION

The main mission of the centre is to realize specific activities of continue training, research, technical assistance, documentation and expertise. In order to realize its mission, the centre has as objectives:

- promotion of works of fundamental and applied research in the field of vibroimpacts, vibrations and technical acoustics;
- expertise and consulting in specialty;
- promotion of the field, selected from the themes of the specialty as a high field, and realization of cooperation programs with other research institutes in this field;

RESEARCH FIELDS

The main fields of the research are:

- vibroimpacting interactions and vibroimpacts
- mechanical vibrations
- technical acoustics
- vibrations of nonlinear systems

KEYWORDS

Vibration, vibroimpact, noise, impact, spectrum, auto-spectrum, prediction, diagnosis, homotopy variational method; stability, weakly nonlinearity

ACTIVITIES

- Dynamics of vibroimpact systems. Theoretical and experimental methods for the study of stable vibroimpact motions;
- Modeling of work of vibroimpact mechanisms, calculus and optimization algorithms;
- Methods of study for the vibrations of mechanical systems, with applications in engineering. Diagnosis by vibrations of defections at machines and equipment;
- Theoretical and experimental studies, concerning the elaboration of new methods and equipment for the decreasing of levels of vibrations and noises;
- Expertise of capacity of isolation at airy noise of building elements. Determination of noise levels at civil buildings;
- Application of the Homotopy method to the study of stability of nonlinear oscillation with cubic elastic restoring force

RESEARCH PROJECTS

1. GAR Project 96/2005, *Nonlinear behaviors, characteristic to impacts in vibroimpact systems*, Director: Prof. dr. eng. Liviu Brîndeu, Value: 2.500 RON
2. GAR Project 88/2005, *Studies and researches on the vibrations and shocks produced on the flexible mechanical structure models*. Director: Prof. dr. eng. Mihai Toader, Value: 2.500 RON
3. CNCISIS Project 32940/2004, addendum 2005 theme 8, *Dynamics and optimization of work of roto-percussive and percussive drilling equipment*, Director: Prof. dr. eng. Adrian Chiriac, Value: 15.000 RON

4. CNCISIS Project 32940 / 2004, addendum 2005 theme 13, *Researches and applications of dynamics of linear and non-linear systems submitted to vibrating and vibroimpacting actions*, Director: Assoc. prof. dr. eng. Nicolae Herișanu, Value: 19.000 RON
5. CNCISIS Project 27688/14.03.2005, theme 18, *Nonlinearity effects in the study of continue media vibrations*, Director: Prof. dr. Vasile Marinca, Value: 15.000 RON
6. CNCISIS Project 27688/14.03.2005, theme 34, *Theoretical and experimental researches concerning the mechanical system with vibrating and vibroimpacting action. Structural parameter optimization*. Director: Prof. dr. Mihai Toader, Value: 10.000 RON
7. CNCISIS Project 27688/14.03.2005, theme 4, *Researches concerning vibrations of vehicle equipped with semi-active dampers with magnetorheological fluids*. Director: Prof. dr. eng. Liviu Bereteu, Value: 10.000 RON
8. Contract 295/14.07.2005, *Balancing and determinations of center of gravity by tensiometric methods at equipment of coal storage or surface exploitations*, Director: Prof. dr. eng. Titus Cioara, Value: 36.010 RON, Beneficiary SC. Termocentrale SA Turceni, SC. PRO ATLAS Timișoara
9. Contract 76 / 2004, addendum 2005. *Determination of real characteristics of work at Petriman and Lotru pump stations*, Director: Prof. dr. eng. Titus Cioara, Value: 4.000 RON, Beneficiary SC. Hidroelectrica SA, Suc. Hidrocentrale Râmnicu Valcea
10. Contract BC Nr. 76/13.10 2005, *Vibrometric measurements*, Director: Prof. dr. eng. Titus Cioara, Value: 1.000 RON, Beneficiary SC. SOL PLUS Timișoara
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6. Csizmadia, B., Hegedus, A., Brîndeu, L., *Vibration stability questions of circular moving grain separator*, Proceedings VIIIth Symp. on Acoustics and Vibrations of Mechanical Structures, 26-27 May, 2005, Timișoara, ISBN 973-625-238-8, pp. 17-23
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10. Smicală, I., *Considerations on the percussion effect of friction forces in the coplanar collision*, Proceedings VIIIth Symp. Acoustics and Vibrations of Mechanical Structures, 26-27 May, 2005, Timișoara, ISBN 973-625-238-8, pp. 170-176
11. Nagy, R., Boltoși, A., Baltă A., *Considerations regarding the impulsive forces and distributions in the study of vibroimpact*, Proceedings VIIIth Symp. on Acoustics and Vibrations of Mechanical Structures, 26-27

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1. Brîndeu, L., Bereteu, L., Nagy, R., Boltoși, A., *Modeling of work of shock damper with magnetorheological fluid*, Annals of the Oradea University, Fascicle of Management and Technological Engineering, CD-ROM Edition, Vol IV (XIV), 2005, ISSN 1583-0691, pp. 40
2. Brîndeu, L., Nagy, R., *Domains of including of vibroimpact periodic regimes in relation to the possible motions*, Annals of the Oradea University, Fascicle of Management and Technological Engineering, CD-ROM Edition, Vol IV (XIV), 2005, ISSN 1583-0691, pp. 51
3. Marinca, V., Herișanu, N., *Study of the stability of periodic responses for the Duffing oscillator*.

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12. Boltoși, A., Chiriac, A., Baltă A., *Actuating of the plane sieves by crank and connecting rod assembly*, Proceedings VIIIth Symp. Acoustics and Vibrations of Mechanical Structures, 26-27 May, 2005, Timișoara, ISBN 973-625-238-8, pp. 185-192
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 14. Popa Radovan, S., *About displacement of material points in certain concave contours*. Proceedings VIIIth Symposium, Acoustics and Vibrations of Mechanical Structures, 26-27 May, 2005, Timișoara, ISBN 973-625-238-8, pp. 201-206
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SCIENTIFIC EVENTS

1. Proceedings of the XIth International Conf. on Vibration Engineering, Timișoara, Sept. 27-30, 2005
2. Proceeding of the VIIIth Symposium on Acoustics and Vibrations of Mechanical Structures, 26-27 May, 2005, Timișoara

PhD THESIS

Moga Ioan, *Influence of vibro-shock using on the quality of cutting process*, 2 June, 2005, PhD coordinator: Brîndeiu Liviu

PhD THEMES

Scientific supervisor: Prof.dr.eng. Liviu Brîndeiu

1. Roșoga Daniela Lucia, *Mathematical models in the study of cylindrical sieves*.
2. Hule Hora Voichița, *Dynamic systems with percussive interaction in the hypothesis of local contact deformations*
3. Muntean Dragoș Horea, *Contribution to the realizing of a center of prediction and diagnosis at vibrations for mechanical systems*
4. Tobă Alexandru, *Influence of direction angles in the vehicle dynamics*
5. Stavrat Laurențiu, *Study of sonorous pollutions of urbane centers*
6. Coloji Dan Ovidiu, *Influence of damping systems on the dynamic behavior of the car*
7. Abrudan Vasile, *Optimization of shock applying in technological processes in food industry*

8. Petcovici Oana, *Methods of simulation of periodic vibroimpact motions*
9. Zablău Ion, *Researches concerning the dynamics of special mechanical transmissions*
10. Costea Gabriela, *Researches concerning the collision of mechanical systems taking into account the local contact deformations*
11. Becheru Gheorghe, *Study of power circulation in the transmission of vehicles with integral driving in dynamic regime*
12. Fântână Nicolae Eugen, *Measures of noise and vibration reduction in order to assure the environment comfort at heating systems with radiant panels, respectively, radiant floors*
13. Nagy Ramona, *Researches concerning the nonlinear behavior of some mechanical systems with discontinuities due to impacts*
14. Lupu Ioan, *Vibrations and vibroimpacts at electromechanical systems*
15. Birceanu Dănuț, *Study of noise generated by the elastic collision of two bodies*
16. Heidelbacher Iosif, *Researches concerning the behavior at shocks and vibrations of composite materials, used in the machine building*
17. Negomireanu Gheorghe, *Performing piezoelectric materials of type Langasit, used in the vibro-acoustical field*
18. Palincaș Gabor Romeo, *Researches concerning the work of attachment -detachment device of an airbag*
19. Baltă Adriana Elena, *Working improvement of system of knitting machines by realizing of mechanisms that eliminate the shocks and vibrations and, also, by optimizing the commands*
20. Oprețescu Cristina, *Numerical simulation for the motions with mechanical constraints and collisions*
21. Boltoși Alexandru, *Vibration attenuators realized with magnetorheological composites*

Scientific supervisor: Prof.dr.eng. Titus Cioară

1. Angheliescu Rodica Delia, *Optimizing methods in the study of vibrations and vibroimpacts*
2. Căplescu Cristiana, *Methods and processing algorithms for the vibration signals*
3. Țîrdea Amalia, *Methods and equipment for vibration isolation for the mechanical pressing machines*
4. Tocarciuc Alexandru, *Theoretical and experimental studies concerning the dynamic*

effects that appear in the poly-phase fluid transport by pipe networks

5. Simoiu Dorin, *Theoretical and experimental studies concerning the loads, induced by the wind on a mechanical structure. Applications to a structure of parabolic aerial*
6. Tupan Felicia, *Computer processing of experimental data of noises and vibrations*
7. Nicolae Ionel Valentin, *Internet monitoring and wireless solutions for the mechanical parameters*

PERSPECTIVES

The results obtained by the collective will be developed in a few priority directions, concerning the elaboration of general methods for the study of vibroimpact motions, modeling of work of mechanisms (calculus algorithm and optimization), studies concerning the attenuation of sonorous sources and elaboration of methods and equipment for the decreasing of vibration levels.

RESEARCH TEAM

- Prof. dr. eng. Liviu BRÎNDEU
- Prof. dr. Vasile BACRIA
- Prof. dr. eng. Liviu BERETEU
- Prof. dr. eng. Adrian CHIRIAC
- Prof. dr. eng. Titus CIOARĂ
- Prof. dr. Vasile MARINCA
- Prof. dr. eng. Ioan SMICALĂ
- Prof. dr. Mihai TOADER
- Assoc. prof. dr. Pantele CHELU
- Assoc. prof.dr. Gheorghe DRĂGĂNESCU
- Assoc. prof. dr. eng. Nicolae HERIȘANU
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- Lect. dr. eng. Alexandru DĂNOIU
- Lect. eng. Nicolae FÂNTÂNĂ
- Lect. dr. eng. Gheorghe LUCA
- Lect. dr. eng. Smaranda POPA–RADOVAN
- Assist. eng. Ramona NAGY
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- Eng. Adriana BALTĂ, PhD student
- Eng. Cristina BASARABĂ–OPRIȚESCU, PhD student
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- Phys. Alexandru BOLTOȘI, PhD student
- Math. Gabriela COSTEA, PhD student
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INTEGRATED ENGINEERING RESEARCH CENTRE

I. E. R. C.

GENERAL PRESENTATION AND MISSION

The *Integrated Engineering Research Centre (IERC)* is organized within the Department of Manufacturing Engineering (TCM), the Department of Mechanical Technology (TM) and the Department of Welding Equipment and Technology (UTS). IERC is organized as a research unit and transfer of technology of the "Politehnica" University of Timișoara. IERC is accredited by the National Scientific Research Council for Higher Education (CNCSIS - Romania) with the certificate CNCSIS no. 103 / CC-C in May 11, 2001.

IERC mission is to coordinate teams of researchers from different departments of the Faculty of Mechanical Engineering, who are developing programs in the integrated engineering field of research.

RESEARCH FIELDS

The main fields of research are:

- Products, processes and manufacturing systems integrated design;
- Processes and manufacturing systems integrated management;
- Products and manufacturing devices new models design;
- Integrated Design of products, manufacturing processes and systems;
- Integrated control of the manufacturing processes and systems;
- New products and manufacturing equipment;
- Welding processes modelling;
- Advanced materials joining
- Welding technology optimisation using computer
- Limiting methods for stress and distortion in welded structures;
- Defectology of welded structures
- The development of the equipments and technologies for non-conventional technological processes
- Studies referring to the optimization of laser materials processing
- Studies referring to the development of modern constructive solutions for making of technological equipment from the processional and food industry
- The creation and the making of piezoceramic traducers for the usage in the construction of technological equipment
- Studies referring to the degradation of the materials used in technologies equipment and

the calculation of the remaining durability of exploitation

- Optimizing metallic flexible pipes processing

KEYWORDS

Integrated engineering, Concurrent engineering, Manufacturing engineering, Materials advanced welding, Manufacturing processes management, Platurgy, Rapid prototyping and three-dimensional measurements, Cold forming, Non-traditional machining processes, Welding processes, Welding equipment, Defectology, Quality assurance, Equipment and technologies for non-conventional technological processes, Laser materials processing, Plan and equipment for food industry, Piezoceramic traducers, Degradation of materials, remaining durability of exploitation.

ACTIVITIES

- IERC assure the co-ordination and harmonization of the training programs through scientifically research (PhD. programs, post-graduated programs) for the researchers or research teams of different departments. The post-graduate program developed by IERC is: *Integrated Engineering*. The PhD. programs coordinated by IERC are in the field of Industrial Engineering.
- The research teams from IERC develop: fundamental and applicative research activities; products and technology design activities; technological development and technology transfer all attending the present industrial demands.
- IERC is involved in national and international research programs, is member of different professional and scientifically organizations and organizes different scientific meetings (seminars, conferences etc.).
- Participation to the EU Sixth Framework Programe (FP6) as a partner to a network of excellence project: *Virtual Research Lab for a Knowledge Community in Production (VRL-KCiP)*, contract no. FP6-507487-2
- Participation to grant competitions through CNCSIS, national programmes RELANSIN, AMTRANS, INFRAS, MATNANTECH etc.
- Developing of fundamental and applicative research activities, technological development for the present industrial demands, welders

education and qualification according to EN 287, welding procedures qualification according to EN 288-3 and AD-Mblt. HPO, welders certification, according to TÜV requirements, technical supervision of the pressure vessels, tanks and complete projects according to TÜV requirements.

- IERC members are part of the following professional bodies and associations:
 - AGIR – The General Association of the Engineers in Romania
 - AUIF – Academic Association of Manufacturing Engineering in Romania
 - ARTN – Romanian Association of Nonconventional Technologies
 - ASR – Romanian Welding Society
 - ACM-V – Association for Multidisciplinary Research West Zone
 - AWS – American Welding Society
 - ISL-FD – International Society of Lyophilization- Freeze Drying
 - B.EN.A – Balkan Environmental Association

RESEARCH CONTRACTS

1. Contract NMP2-CT-2004-507487 FP6, *Virtual Research Lab for a Knowledge Community in Production*, Network of Excellence, Director: Prof.dr.eng. George Drăghici, Value for 2005: 25.000 €
2. CNCISIS nr. 32940, T21 / 2004, T27 / 2005, *Evaluation and consulting Pole for innovativ technical ideas*, Director: dr.eng. Daniel Stan, Value for 2005: 18.000 RON
3. CNCISIS 32940/2005, *Reverse engineering of the products by using rapid prototyping and 3D measurements techniques*, Director: Lecturer dr.eng. Aurel Tulcan, Value for 2005: 11.000 RON
4. Contract 3146/2003-2005, National CALIST Program: *Component's fiability evaluation with high loaded in risk condition for industrial syyetms*, Director: prof.dr.eng. Traian Fleser, Value: 30.000 RON
5. CNCISIS 621, contract 27688, theme 5/2005, *Research about systemic approach and mathematical modelling reconditions of will's cylinders are turned with inductive pore-heating*, Director: assoc.prof.dr.eng. Eugen Florin Cicală, Value: 7.550 RON
6. AMTRANS Grant C501-2003 / 2005, *Rehabilitation "in situ" of Railroad Infrastructure Elements*, Director: Assoc.prof. dr. eng. Mihaela Popescu, Value for 2005: 40.140 RON
7. AMTRANS Grant C605-2003 / 2005, *Technological Center for Mechanized Welding*

Fabrication and Reability of Railroad Elements, Director: Prof.dr.eng. Gheorghe Gliță, Value for 2005: 45.835 RON

Prospective:

- Participation to the **EU Sixth Framework Programe (FP6)** as a partner to a network of excellence project: *Virtual Research Lab for a Knowledge Community in Production (VRL-KCiP)*, contract no. FP6-507487-2
- Participation to grant competitions through CNCISIS, national programmes RELANSIN, AMTRANS, INFRAS, MATNANTECH etc.

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2. Drăghici, G. (editor), *International Conference on Integrated Engineering C2I 2005*, Politehnica Publishing House, Timișoara, 2005, ISBN 973-625-259-0, 196 pages + CD-ROM
3. Țucu, D., Mnerie, D. (editors), *Integrated systems for agri-food production – proceedings of the International Conference*, 24-26 Nov. 2005, Orizonturi Universitare Publishing House, Timisoara, ISBN 973-638-225-7, 332 pages + CD-ROM
4. Miloș, L., *Welding processes* (published in Romanian), Politehnica Publishing House, Timișoara, 2005, ISBN 973-625-275-2, 350 pages

BVT

1. Galeriu, C., Grita, G., *Efficiency increasing procedure and eolian turbine rotor with horizontal axis*, OSIM Bucharest

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1. Pircea, I., Grosu, I.F., *The assignment of the tolerances subject to minimal manufacturing costs*, International Conference on Integrated Engineering C2I 2005, Timisoara, 16-18 Oct, 2005, Romania, CD, ISBN 973-625-259-0, 6 pages
2. Turc, C., *Control of the Current Pulse Duration in Sinking EDM Using a Fuzzy Logic Controller*, Academic Journal of Manufacturing Engineering, Vol.3, No.2 / 2005, ISSN 1583-7904, pp. 78-83
3. Turc, C., *The Electrical Discharge Machining Optimization Using Data Acquisition Systems*, CIRP Life Cycle Engineering Seminar - 12th

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PhD THESIS

1. Gal Lucian, *Contributes proving the manufacturing errors influence of CNC lathes upon the manufacturing precision*, Thesis supervisor: Prof.dr.eng. Aurel Dreucean
2. Adelina - Alina Han, *Comportement tribologique des surfaces de polymeres traitees par laser*, Doctorat en cotutelle avec l' Universite de Bourgogne, Laboratoire Laser et Traitement de materiaux, Chalon-sur-Saone, 2005; Directeurs de these: A. Nichici, D. Grevey, G. Pillon

PhD STUDENTS

1. Aurelia Marșieu, *Psycho-Sociological Methods and Tools Development for the Management Competencies in the Context of the Integrated Engineering*, Thesis supervisor: Prof. George Drăghici, since 2001
2. Sorin Lemac, *Mathematical Models Entities for Manufacturing*, Thesis supervisor: Prof. George Drăghici, since 2001
3. Lidia Dejeu, *Product Modeling for the First Design Stages*, Thesis supervisor: Prof. George Drăghici, since 2002
4. Felicia Banciu, *Developing of a Innovative, Collaborative Product Design Platform*, Thesis supervisor: Prof. George Drăghici, since 2002
5. Vasile Anghel, *Researches Regarding Industrial Maintenance's Models, Methods and Tools for The Nuclear Field*, Thesis supervisor: Prof. George Drăghici, since 2002
6. Ana-Andreea Mihărtescu, *Customer Requests Integration in the Product Design Stage*, Thesis supervisor: Prof. George Drăghici, since 2003
7. Alin Schmidt, *Product Model Development in the Integrated Engineering Context*, Thesis supervisor: Prof. George Drăghici, since 2004
8. Alina Donose, *Conceptual Design Process Modeling in the Integrated Engineering Context*, Thesis supervisor: Prof. George Drăghici, since 2004
9. Adrian Orita, *Functional Design for Product*, Thesis supervisor: Prof. George Drăghici, since 2005

RESEARCH TEAM

IERC consists of research teams with common research projects, in three departments: Manufacturing Engineering, Mechanical

Technology and Welding Equipments and Technology. The human resources consist of researchers which are doctor degree graduates or which leads post-graduates programs. Also, in the team are working post-graduates and master students.

The IERC management is assured by the director and the Scientific Council, which is composed of professors or associate professors that have been recognized for their research activity and results.

The Scientific Council is composed of the research team leaders.

The members of the research team are:

- Prof. dr. eng. George Drăghici – IERC director
- Prof. dr. eng. Mihai Nica – team leader
- Prof. dr. eng. Tudor Iclănzan – team leader
- Prof. dr. eng. Livius Milos – team leader
- Prof. dr. eng. Gheorghe Gliță – team leader
- Prof. dr. eng. Traian Fleșer – team leader
- Prof.dr.eng. Richard Herman – team leader
- Prof.dr.eng. Dumitru Mnerie – team leader
- Prof. dr. eng. Dumitru Țucu – team leader
- Prof. dr. eng. Petru Suru
- Assoc. prof. dr. eng. Ion Grozav
- Assoc. prof. dr. eng. Eugen Pămîntaş
- Assoc. prof. dr. eng. Viorel Putz
- Assoc. prof. dr. eng. Florin Grosu
- Assoc. prof. dr. eng. Valentin Seiculescu
- Assoc. prof. dr. eng. Ioan Pircea
- Assoc. prof. dr. eng. Dănuț Șosdean
- Lect. dr. eng. Adrian But
- Lect. dr. eng. Cristian Turc
- Lect. dr. eng. Daniel Stan
- Lect. dr. eng. Aurel Tulcan
- Assist. Eng. Florin Ferician
- Assist. Eng. Cristian Cosma
- Assist. Eng. Adrian Dume
- Assist. Eng. Felicia Banciu

- Assist. Eng. Lidia Dejeu
- Eng. Alin Sirbu, PhD student
- Eng. Alin Schmidt, PhD student
- Eng. Alina Donose, PhD student
- Prof. dr. eng. Voicu Safta, Academic of European Science and Arts, Academic of Technic Science from Romania
- Assoc. prof. dr. eng. Mihaela Popescu
- Lect.dr.eng. Dan Mălai
- Lect. dr. eng. Doru Dumbrovă
- Lect. dr. eng. Mircea Burcă
- Lect.dr.eng. Daniel Țunea
- Assist.eng. Aurelian Magda
- Eng. Eduard Berger – PhD student
- Prof. dr. eng. Aurel Mărcușanu
- Prof. dr. eng. Mihai Ghiță
- Prof. dr. eng. Vasile Popovici
- Prof. dr. eng. Titus Slavici
- Assoc. prof. dr. eng. Nicolae Crainic
- Assoc. prof. dr. eng. Mircea Olariu
- Assoc. prof. dr. eng. Eugen Cicală
- Assoc. prof. dr. eng. Antoniu-Levay Reviczky
- Assoc. prof. dr. eng. Mircea Vasilescu
- Lect. dr. eng. Traian Botea
- Lect. dr. eng. Ioan Groza
- Assist. dr. eng. Sorin Ignat
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RESEARCH CENTRE FOR PROCESSING AND CHARACTERISATION OF ADVANCED MATERIALS

MAIN RESEARCH FIELDS

Examinations and thermal analysis, design and elaboration of advanced materials and improvement of the processing technologies, thermo-mechanical processes for improving materials characteristics, training and consulting for specialists from the industry in the field of investigations, technology and designing of materials.

- Studies and investigations on metallic glasses Fe-Ni-P and Fe-Cr-P

Keywords: amorphous alloy, liquid quenching, ribbons, powders, thermo-stability, magnetic properties

- Studies and researches on behaviour of materials during welding and weldability of materials

Keywords: weldability, welding, microstructural investigations, mathematical modelling

- Manufacturing and characterization of advanced materials

Keywords: amorphous, metallic matrix composites, stainless steels, micro-alloyed steels

- Increasing fiability of machine parts by mean of surface treatments and use of advanced materials

Keywords: plasma nitriding, gas carbonising, surface inductive treatment

- Modern investigation of materials structure and properties, image acquisition and processing in optic and electronic microscopy

Keywords: digital photo camera, computer aided image processing, image archive

Researches in *STUDIES AND INVESTIGATIONS ON THE METALLIC GLASSES Fe-Ni-P AND Fe-Cr-P*

FIELD DESCRIPTION

Metallic glasses are a new class of materials used in applications that require high saturation magnetic induction and low magnetic loss, in high strength fibres and for magnetic shielding.

ACTIVITIES AND RESULTS

Researches on Fe-Ni-P and Fe-Cr-P amorphous alloys allowed designing of an elaboration technology and corresponding facilities for amorphous ribbons and powders.

The properties of the obtained ribbons and powders were studied by X-ray analysis, in order to observe the materials amorphous change. The researchers aim is to obtain magnetic materials with outstanding properties.

Researches in *SHAPE MEMORY ALLOYS*

FIELD DESCRIPTION

The shape memory alloys are materials with a large number of interesting properties as: shape memory effect, pseudoelastic behaviour and high dumping capacity.

ACTIVITIES AND RESULTS

Researches on Fe-Ni-P and Fe-Cr-P amorphous alloys allowed designing of an elaboration technology and corresponding facilities for amorphous ribbons and powders.

The properties of the obtained ribbons and powders were studied by X-ray analysis, in order to observe the materials amorphous change. The researchers aim is to obtain magnetic materials with outstanding properties.

Researches in *METAL MATRIX COMPOSITES*

FIELDS DESCRIPTION

Particle reinforced metal matrix composites are relatively new class of materials witch combine high mechanical properties with cost that are significant lower in comparison with long fibber reinforced composites.

ACTIVITIES AND RESULTS

A new class of particle reinforced composites based on a hardenable Al-Cu-Si-Mg reinforced with SiC particles (10 µm average dimension) has been produced via a powder metallurgy technique.

Significant progresses have been made in technological optimisation, as well as the characterization of some important mechanical properties and the structural changes during heat treatment or thermo-mechanical processing of the materials.

Researches in *TECHNOLOGY AND EQUIPMENT FOR INDUCTION HARDENING*

FIELD DESCRIPTION

Surface treatments are important in order to improve exploitation characteristics of wear stressed machine parts. Induction hardening is the proper treatment for cylindrical parts and plane surfaces, applied in serial manufacturing.

ACTIVITES AND RESULTS

The research team developed and optimised surface hardening technologies by inductive treatment of different machine parts as: camshaft, guide conduit, inner cylindrical surfaces. A significant reduction of heating time and improve of exploitation characteristics of stud and railway switches was obtained.

Researches in *INCREASE OF RELIABILITY ON DIFFERENT MACHINE PARTS BY SURFACE ENGINEERING*

FIELD DESCRIPTION

Modern technology requires high quality machine parts with improved mechanical properties and reduced specific weight. Surface treatment as plasma nitriding and gas carburising on medium and high alloyed steels are meant to improve wear and fatigue strength, together with good behaviour in presence of dynamic stresses.

ACTIVITIES AND RESULTS

Advanced researches on plasma nitriding, gas carburising on medium and high alloyed steels, surface inductive treatment offer ready-to-use treatment technologies at industrial scale for high quality machine parts.

Researches in *MODERN INVESTIGATION OF MATERIALS STRUCTURE AND PROPERTIES, IMAGE ACQUISITION AND PROCESSING IN OPTICAL AND ELECTRONIC MICROSCOPY*

FIELD DESCRIPTION

Optical and electronic microscopy are investigation methods that provide complete information concerning the structure of materials. Computer aided acquisition and processing of images aloud

the increase of the above methods' efficiency, for quantitative as well as qualitative measurements.

ACTIVITIES AND RESULTS

The improvement of the investigation equipment and the image acquisition and processing methods lead to the increase of the metallographic investigations results (image quality, measurements precision).

MAIN PUBLICATIONS

BOOKS

1. Mitelea, I., Gîrniceanu, Gh., Gugn, R., *Heat treatment of steels and castirons* (published in Romanian), Ed. Didactică și Pedagogică Bucharest, 2005, ISBN 973-30-2346-9, 313 pages
2. Crăciunescu, C.M., *Shape Memory Alloys Micro and Nanoengineering*, (published in Romanian), Politehnica Publishing House, Timișoara, 2005, ISBN 973-625-216-7, 256 pages
3. Șerban, V.A., Răduță, A., Codrean, C., *Material and primary technologies in experiments*, second edition, (published in Romanian), Politehnica Publishing House, Timișoara, 2005, ISBN 973-8247-62-4, 123 pages
4. Udrescu, L., *Surface treatments and coatings* second edition, (published in Romanian), Politehnica Publishing House, Timișoara, 2005, ISBN 973-625-227-2, 302 pages
5. Trușculescu, M., *Materialotehnica*, second volume "The Basis of Thermal Treatments", (published in Romanian), Politehnica Publishing House, Timișoara, 2005, ISBN 973-625-240-7, 371 pages

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2. Ghirasim, T., Cartiș, I.Gh., *Betrachtungen über die Wirtschaftlichkeit der Reparatur oder des Austausches von Wälzlagern grosser Abmessungen bei Schwermaschinen*, Scientific Bulletin of the "Politehnica" University of Timișoara, Transactions on Mechanics Special issue, IX-th Edition Timișoara Academic Days, International Symposium Engineering Materials – New Horizons and Processing Techniques, Tom 50(64), May 26-27, 2005, ISSN 1224-6077, pp. 211-216
3. Uțu, D., Mărginean, G., Brandl, W., Cartiș, I., *Experimental studies for determination of the minimal remelting depth necessary for a good oxidation behaviour of MCrAlY coatings*, Scientific Bulletin of the "Politehnica" University of Timișoara, Transactions on Mechanics Special issue, IX-th Edition Timișoara Academic Days, International Symposium Engineering Materials – New Horizons and Processing Techniques, Tom 50(64), May 26-27, 2005, ISSN 1224-6077, pp. 89-94
4. Duma, S., Cartiș, I., Cotuna, D., *Studies regarding the acquirement of hardness standard blocks for transmitting the Knoop hardness scale 200...550HK0.2*, Scientific Bulletin of the "Politehnica" University of Timișoara, Transactions on Mechanics Special issue, IX-th Edition Timișoara Academic Days, International Symposium Engineering Materials – New Horizons and Processing Techniques, Tom 50(64), May 26-27, 2005, ISSN 1224-6077, pp. 47-52
5. Duma, S., Budău, V., *The influence of technological parameters of the solid environment carburization upon the hardness and structure of OLC15 (C15), 13CrNi30 (13NiCr12-4) and 18MnCr10 (18CrMn4-4) steels*, Scientific Bulletin of the "Politehnica" University of Timișoara, Transactions on Mechanics Special issue, IX-th Edition Timișoara Academic Days, International Symposium Engineering Materials – New Horizons and Processing Techniques, Tom 50(64), May 26-27, 2005, ISSN 1224-6077, pp. 39-46
6. Uțu, D., Brandl, W., Mărginean, G., Cartiș, I., Șerban, V.A., *Morphology and phase modification of HVOF- sprayed MCrAlY-coating remelted by electron beam irradiation*, Vacuum 77, 2005, pp. 451- 455
7. Uțu, D., Mărginean, G., Brandl, W., Cartiș, I., *Improvement of the oxidation behaviour of electron beam remelted MCrAlY coatings*, Solid State Sciences, 7, 2005, pp. 459- 464
8. Mitelea, I., *Opportunities of the vacuum technique in the heat treatments development*, Scientific Bulletin of the "Politehnica" University of Timișoara, Transactions on Mechanics Special issue, IX-th Edition Timișoara Academic Days, International Symposium Engineering Materials – New Horizons and Processing Techniques, Tom

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9. Mitelea, I., Georgevici, I., Radu, I., *Gas nitriding stainless steel with "mild" martensite structure*, Scientific Bulletin of the "Politehnica" University of Timișoara, Transactions on Mechanics Special issue, IX-th Edition Timișoara Academic Days, International Symposium Engineering Materials – New Horizons and Processing Techniques, Tom 50(64), May 26-27, 2005, ISSN 1224-6077, pp. 25-32
 10. Borșun, C., Mitelea, I., Miloș, L., *Analysis of laser welded joints on "C" alloy used in the removable partial dentures technology*, European Cells and Materials Journal, vol. 10, Supplement 1, July 2005, Mägenwil, Switzerland, pp. 187-206
 11. Mitelea, I., Bordeasă, I., Hadăr, A., *The effect of nichel content upon cavitation erozion for stainless steels with 13% chromium and less than 0,1% carbon*, Journal of Chemistry, Bucharest, vol. 56, nr. 11, 2005, ISSN 0034-7752, pp. 1069-1174
 12. Șerban, V.A., Codrean, C., *The synththesis methods analysis of ferromagnetic nanostructured alloys*, Scientific Bulletin of the "Politehnica" University of Timișoara, Transactions on Mechanics Special issue, IX-th Edition Timișoara Academic Days, International Symposium Engineering Materials – New Horizons and Processing Techniques, Tom 50(64), May 26-27, 2005, ISSN 1224-6077, pp. 17-20
 13. Șerban, V.A., Codrean, C., Călin, M., *Effect of the nanostructure on mechanical peoperties of the $Al_{85}Ni_0Nd_4Co_2$ alloy*, Scientific Bulletin of the "Politehnica" University of Timișoara, Transactions on Mechanics Special issue, IX-th Edition Timișoara Academic Days, International Symposium Engineering Materials – New Horizons and Processing Techniques, Tom 50(64), May 26-27, 2005, ISSN 1224-6077, pp. 21-24
 14. Radu, B., Codrean, C., *Finite element modeling in induction brazing of stainless steels with quasi-amorphous brazing alloys*, Scientific Bulletin of the "Politehnica" University of Timișoara, Transactions on Mechanics Special issue, IX-th Edition Timișoara Academic Days, International Symposium Engineering Materials – New Horizons and Processing Techniques, Tom 50(64), May 26-27, 2005, ISSN 1224-6077, pp. 67-72
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 18. C.M. Căciunescu, V. Budău, *Thermoelastic stresses in sputter-deposited shape memory alloy films*, Sudura - Romanian Welding Society Review 2005, ISSN 1453-0384, pg. 5-10
 19. Crăciunescu, C.M., Mihalca, I., Budău, V., *Signal modulation by martensitic control of shape memory alloy thin film architectures*, Proceedings of Conf. Device Applications of Nonlinear Dynamics DANOLD, Catania, Spain, Oct. 2-6, 2005
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 21. Raduta, A., Nicoara, M., Demian, C., Firu, C., *Behaviour at Mechanic and Thermal Stresses in Corrosive Environment of the Welded Joints Produced on Austenitic Stainless Steels*, Scientific Bulletin of the "Politehnica" University of Timișoara, Transactions on Mechanics Special issue, IX-th Edition Timișoara Academic Days, International Symposium Engineering Materials – New Horizons and Processing Techniques, Tom 50(64), May 26-27, 2005, ISSN 1224-6077, pp. 167-170
 22. Raduță, A., Nicoară, M., Locovei, C., *Researches Regarding the Fatigue Behavior of Railway Wagon Axles*, Scientific Bulletin of the "Politehnica" University of Timișoara, Transactions on Mechanics Special issue, IX-th Edition Timișoara Academic Days, International Symposium Engineering Materials – New Horizons and Processing

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23. Raduță, A., Nicoară, M., Liță, M., Demian, C., *The influence of deformation on the martensite proportion of austenitic steels*, Scientific Bulletin of the "Politehnica" University of Timișoara, Transactions on Mechanics Special issue, IX-th Edition Timișoara Academic Days, International Symposium Engineering Materials – New Horizons and Processing Techniques, Tom 50(64), May 26-27, 2005, ISSN 1224-6077, pp. 181-188
 24. Nicoară, M., Raduță, A., Șerban, F., Lodini, A., *L'influence de la déformation plastique sur l'état de contraintes résiduelles dans les fontes ADI*, Scientific Bulletin of the "Politehnica" University of Timișoara, Transactions on Mechanics Special issue, IX-th Edition Timișoara Academic Days, International Symposium Engineering Materials – New Horizons and Processing Techniques, Tom 50(64), May 26-27, 2005, ISSN 1224-6077, pp. 189-192
 25. Bartus, S., Budau, V., Craciunescu, C.M., *Microactuation by thermoelastic control of the martensitic transformation*, Scientific Bulletin of the "Politehnica" University of Timișoara, Transactions on Mechanics Special issue, IX-th Edition Timișoara Academic Days, International Symposium Engineering Materials – New Horizons and Processing Techniques, Tom 50(64), May 26-27, 2005, ISSN 1224-6077, pp. 53-56
 26. Beleiu, L., Craciunescu, C.M., *Preliminary tests concerning shape memory alloy biocompatibility*, Scientific Bulletin of the "Politehnica" University of Timișoara, Transactions on Mechanics Special issue, IX-th Edition Timișoara Academic Days, International Symposium Engineering Materials – New Horizons and Processing Techniques, Tom 50(64), May 26-27, 2005, ISSN 1224-6077, pp. 73-56
 27. Budau, V., Craciunescu, C.M., *Macro and microscopic analysis of austenitic stainless steel needles subjected to corrosion tests*, Scientific Bulletin of the "Politehnica" University of Timișoara, Transactions on Mechanics Special issue, IX-th Edition Timișoara Academic Days, International Symposium Engineering Materials – New Horizons and Processing Techniques, Tom 50(64), May 26-27, 2005, ISSN 1224-6077, pp. 83-88
- stainless steels.*, scientific supervisor: prof. dr. eng. Ion Mitelea
2. Dragoș Ion Uțu, *Contributions to the enhancement of the corrosion behaviour of MCrAlY layers by surface remelting with an electron beam*. scientific supervisor: prof. dr. eng. Ioan Carțiș
 3. I. Padurean, *Research regarding the enhancement of cavitation erosion resistance of the turbine rotors moulded out of stainless steel.*, scientific supervisor: prof. dr. eng. Marin Trușculescu

PhD STUDENTS

1. Spornic Luminita, *Studies upon structures in the binding area and upon materials' mechanical properties electrically welded by pressure on which thermo-mechanical treatments are imposed*, scientific supervisor: prof. dr. eng. Ioan Carțiș
2. Firu Carmen, *Methods of improving the characteristics of composites with a metal matrix*, scientific supervisor: prof. dr. eng. Ioan Carțiș
3. Popa Dorel, *Methods of improving the characteristics and fiability of railway springs.*, scientific supervisor: prof. dr. eng. Ioan Carțiș
4. Igrat Sorin, *Methods of increasing the fiability of components used for cars*, scientific supervisor: prof. dr. eng. Ioan Carțiș
5. Roșu Radu, *Methods of acquiring and processing of biomaterials for human prosthesis*, scientific supervisor: prof. dr. eng. Ioan Carțiș
6. Popescu Diana – Carmen, *The prediction of structural and mechanical properties of concentrated energy treated steels*, scientific supervisor: prof. dr. eng. Marin Trușculescu

RESEARCH CONTRACTS

1. Contract No. 255 (408) / 2004, Matnantech, *Microsensors and actuators for micro-opto-electro-mechanical systems manufactured by shape memory alloy nanoengineering*, Director: Assoc. prof. dr. eng. Marius Crăciunescu, Value for 2005: 15.000 RON
2. SCOPES Project IB 7420-110981/1 (2005-2008), *Southern Nanoengineering Network (International partnership)*, Director: Assoc. prof. dr. eng. Marius Crăciunescu, Value for 2005: 31.950 CHF
3. PG - No. IB 72-0-110579 / 2005, *Preparatory Grant SONNET*, Director: Assoc. prof. dr. eng. Marius Crăciunescu, Value: 1.500 CHF

PhD THESIS

1. Cosmin Codrean, *Research regarding the brazing process with amorphous alloys of*

4. CEEX Contract No. 7 / 2005, *Nanocontrol and Multifunctionality in Shape Memory Materials, Microlayers and Architectures*, Director: Assoc. prof. dr. eng. Marius Crăciunescu, Value for 2005: 14.500 RON
5. Contract 182/2004-2005, Grant type A, financed by Romanian National Council for Scientific Research (CNCSIS), *Aluminum-Based Metallic Foams Fabricated by Mean of Powder Metallurgy – Processing and Characterization*, Director: Assoc. prof. dr. eng. Mircea Nicoară, Value: 13.000 RON
6. Contract No. 63 16PS546 / 2005, *Study Regarding the Phase Transformations within the Non-Ferrous Parts Produced by mean of Rapid Prototyping for the Increase of Mechanical Properties*, project for scientific inter-university collaboration 2005-2006, between “Politehnica” University of Timișoara, University of Reims Champagne-Ardenne, France and University of Three Rivers Québec, Canada, financed by Academic Francophone Agency (Agence Universitaire de la Francophonie – AUF), Director: Assoc. prof. dr. eng. Aurel Raduta, Value: 12.500 EURO
7. Contract no. 318 / 2005, Promes S.A. Sebis – Arad, *Experimental Researches Regarding the Improvement of Wear Resistance of Railway Bogies by Mean of Surface Hardening*, Director: Assoc. prof. dr. eng. Mircea Nicoară, Value: 7.757,70 RON
8. Contract no. 271 / 2005, *Technical investigations regarding structure and properties of materials and welded joints for the current products of Zoppas Industries Romania Ltd*, Director: Assoc. prof. dr. eng. Aurel Raduta, Value: 15.770,87 RON
9. Contract No. 263 / 23.05.2005, *Preliminary studies and research regarding the fabrication of polimeric composite materials with memory alloy fibres*, Director: Assoc. prof. dr. eng. Marius Crăciunescu, Value: 1.000 RON
10. Contract No. 98 / 01.07.2004, *Technical assistance and metallographic bulletins for macroscopic, microscopic and hardness measurements on welded samples*, Director: prof. dr. eng. Budău Victor, Value for 2005: 5.700 RON
11. Contract No. 27668/2005, Grant CNCSIS, *The production and characterization of ferromagnetical nanostructural alloys out of the Fe-Cr-(Nb, Mo)-P-Si-B family*, Director: prof. dr. eng. Viorel Aurel Șerban, Value: 8.000 RON
12. Contract No. 202/2005, *Study and evaluation methods of the remaining lifetime for boiler elements*, Director: prof. dr. eng. Viorel Aurel Șerban, Value: 20.000 RON

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- Prof.dr.eng. Roland Laurențiu CUCURUZ
- Prof.dr.eng. Viorel Aurel ȘERBAN
- Prof.dr.eng. Livius UDRESCU
- Assoc.prof.dr.eng. Aurel RĂDUȚĂ
- Assoc.prof.dr.eng. Mircea NICOARĂ
- Assoc.prof.dr.eng. Bogdan RADU
- Assoc.prof.dr.eng. M. CRĂCIUNESCU
- Lecturer dr.fiz. Marin LIȚĂ
- Assist.dr.eng. Sebastian Titus DUMA
- Assist.dr.eng. Cosmin CODREAN
- Assist.eng. Carmen OPRIȘ
- Assist.eng. Cosmin LOCOVEI
- Dr.eng. Dragoș UȚU
- Drd.eng. Diana Carmen POPESCU
- Drd.eng. Radu Alexandru ROȘU
- Eng. Angela ZIMCEA
- Eng. Miron GAVRILONI

Contact

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RESEARCH CENTRE FOR QUALITY IN MECHANICAL TRANSMISSION, PRECISION MECHANICS AND MECHATRONICS

GENERAL PRESENTATION

The research center was founded in 11.05.2001 by the teaching staff of the Mechanisms and Machine Parts' Department. The research center was recognized by CNCIS as a C type center with certificate number 71/CC-C/11.05.2001. From 2002, the research center belongs to the Mechatronics' Department from „Politehnica” University of Timisoara.

The head of the research center is **Prof.dr.eng. Dan Perju**

E-mail: Dan.Perju@mec.upt.ro

The major research domains are:

- Mechanical Transmission;
- Precision Mechanics;
- Mechatronics and Robotics

The main research topics are:

- Mechanisms;
- Machine design and parts for precision mechanics and mechatronics;
- Tribology;
- Instrumentation and metrology;
- Optical and opto-electronical apparatus;
- Biomedical apparatus (medical robotics and medical investigation);
- Robotics;
- Mechatronics;
- Simulation and artificial intelligence;
- Finite element analysis;
- Internet teleoperation;
- Domestic robots;
- Prosthesis;
- Actuating systems;
- Computer Aided Design;
- Virtual reality;
- Computer Aided Quality, Quality Assurance, Quality Management.

The research center was founded in order to:

- coordinate the scientific fundamental studies: mechanisms and mechanical transmission;
- robotics, precision mechanics and mechatronics;
- biomedical techniques; instrumentation and control;
- develop applied studies in different research projects for economical societies.

The research team disseminates the results in various publications: books, papers presented at national and international symposia, congresses etc.

MAIN RESEARCH FIELDS

- Theoretical and experimental research of mechanisms and mechanical drives.

Keywords: gears, belts, linkages, cams, variators, tribology, finite element method.

- Robotics

Keywords: robots, flexible fabrication systems, CIM systems, modelling/simulation and artificial intelligence.

- Studies and researches in the precision mechanics field and mechatronics.

Keywords: measuring devices, traducers, metrology, quality assurance and optical systems.

- CAD, artificial intelligence and virtual reality.

Keywords: 3D modeling, virtual reality, finite element method.

Researches in *MECHANISMS AND MECHANICAL DRIVES*

FIELD DESCRIPTION

Theoretical study, design and tests of special purpose mechanisms and mechanical drives, cams and linkages, mechanical variators, behavior of machine elements and mechanisms. Tribological behavior of machine elements and mechanisms.

ACTIVITIES AND RESULTS

Collective competence used in computer aided design for general purpose or special mechanical drives (gears, belts, synchronic - belts etc.). Software for gears, cams and linkages design. Improvement of mechanisms and machine elements standardization. Studies for service life increase and reducing of wear.

RESEARCH TEAM

- Prof.dr.eng. Dan PERJU
- Prof.dr.eng. Francisc KOVACS
- Prof.dr.eng. Octavian GLIGOR
- Prof.dr.eng. Lucian MĂDĂRAS
- Prof.dr.eng. Voicu MESAROȘ-ANGHEL
- Prof.dr.eng. Marius MARINA
- Prof.dr.eng. Arjana DAVIDESCU
- Assoc.prof.dr.eng. Francisc IOANOVICI
- Assoc.prof.dr.eng. Ștefan VARGA
- Assoc.prof.dr.eng. Erwin-Christian LOVASZ
- Assoc.prof.dr.eng. Iosif CĂRĂBAȘ
- Assoc.prof.dr.eng. Mircea DREUCEAN
- Assoc.prof.dr.eng. Veronica ARGESĂNU
- Assoc.prof.dr.eng. Carmen STICLARU
- Assist.eng. Ioan COȚA

- Lect.dr.eng. Angela DREUCEAN
- Lect.dr.eng. Dan MĂRGINEANU
- Lect.dr.eng. Andreea DOBRA
- Lect.dr.eng. Rodica MILITARU,
- Lect.dr.eng. Mihaela JULA,
- Assist.eng. Adriana TEODORESCU.

RESEARCH OFFERS

- Computer aided design of special purpose mechanisms and mechanical drives
- Automatic equipment, reducers and gears
- Design and testing of cam and linkages
- Studies with finite element method.

Researches in **ROBOTICS AND MECHATRONICS**

FIELD DESCRIPTION

Fundamental and applied research in the field of the automation of flexible manufacturing processes, of computer aided design, as well as related to the component equipment's and techniques of flexible manufacturing systems.

ACTIVITIES AND RESULTS

Fundamental, oriented and applied research aiming realization and industrial implementation of computer integrated manufacturing systems. Conception of flexible manufacturing modules, machining of medium – size parts (axles, bushings and prismatic parts). Flexible systems for manufacturing processes.

RESEARCH BENEFICIARIES

Ministry of Education, Ministry of Research and Technology, Fraunhofer Institut IPA Stuttgart, Germany, Technical University of Dresden

RESEARCH TEAM

- Prof.dr.eng. Francisc KOVACS
- Prof.dr.eng. George SAVII
- Prof.dr.eng. Corneliu RĂDULESCU
- Prof.dr.eng. Valer DOLGA
- Prof.dr.eng. Valeria VĂCĂRESCU
- Prof.dr.eng. Voicu MESAROȘ-ANGHEL
- Prof. dr. eng. Inocențiu MANIU
- Assoc.prof.dr.eng. Ștefan VARGA
- Assoc.prof.dr.eng. Mircea DREUCEAN
- Assoc.prof.dr.eng. Nicolae DEHELEAN
- Lect.dr.eng. Sanda GRIGORESCU
- Lect.dr.eng. Anca POPA
- Lect.dr.eng. Aurel DIACONU
- Lect.dr.eng. Milenco LUCHIN
- Lect.dr.eng. Marius MATEAȘ
- Assist.eng. Adrian RADU.

RESEARCH OFFERS

- On- and off-line diagnosis of flexible manufacturing systems components.
- Factory transports flexibility. Conception and industrial implementation of flexible manufacturing systems.
- Conception and different types of sensors.

Modernizing methodologies of NC equipment's.

- Methodologies for integration of equipment purchased from heterogeneous manufacturer in unitary production systems.

Researches in **PRECISION MECHANICS**

FIELD DESCRIPTION

The research in the field of precision mechanics deals with the improvement of the measurement techniques, apparatus and precision mechanics equipment's, as well as quality assurance in mechatronics.

ACTIVITIES AND RESULTS

The analysis, synthesis and testing of apparatus and precision mechanics equipment's, modern laboratory techniques and quality assurance, CAQ.

RESEARCH BENEFICIARIES

Direcția Sanitară Județeană Timiș, S.C. Optica Timișoara, INCDMF București, Ministry of National Education (CNCSIS), Siemens Automotive VDO.

RESEARCH TEAM

- Prof.dr.eng. Dan PERJU
- Prof.dr.eng. Octavian GLIGOR
- Prof.dr.eng. Ioan NICOARĂ
- Prof.dr.eng. Alfred POMMERSHEIM
- Prof.dr.eng. Geroge SAVII
- Prof.dr.eng. Valeria VĂCĂRESCU
- Prof.dr.eng. Valer DOLGA
- Prof.dr.eng. Arjana DAVIDESCU
- Assoc.prof.dr.eng. Corina GRUESCU
- Assoc.prof.dr.eng. Erwin-Christian LOVASZ
- Assoc.prof.dr.eng. Nicolae DEHELEAN
- Lect.dr.eng. Marius MATEAȘ
- Lect.dr.eng. Liana DEHELEAN
- Lect.dr.eng. Adrian George RADU
- Lect.dr.eng. Andreea DOBRA
- Assist.eng. Adriana TEODORESCU.

RESEARCH OFFERS

- Modern techniques for metrological testing. Measuring instruments and equipment's for quality control.
- Optical and optoelectrical equipments. Bio-medical apparatus.

PUBLICATIONS

BOOKS

1. Madaras, L., Ioanovici, Fr., Argesanu, V., Julu, M., *Machine elements*, vol. 1, Eurostampa Publishing House, Timisoara, 2005, ISBN 973-687-307-2, 973-687-308-0, 391 pages
2. Gruescu, C., Bodea, R., Pommersheim, A., *Optical measurements*, second edition, Politehnica Publishing House, Timișoara, 2005, ISBN 973-625-195-0, 52 pages

3. Gruescu, C., Bodea, R., *Elements of analysis and synthesis of optical systems. Applications*, Politehnica Publishing House, Timișoara, 2005, ISBN 973-625-196-9, 105 pages
4. Perju, D., Ianoși, E., Mateaș, M., Duma, V., *Measurement systems - experimentally techniques*, Politehnica Publishing House, 2005, ISBN 973-625-194-2, 267 pages

PUBLISHED PAPERS

1. Gruescu, C., Costache, M., *Design of a Kepler Telescope Providing an Erected Image*, Scientific Bulletin of the "Politehnica" University of Timișoara, Trans. on Physics, ISSN 1224-6077, 2005, pp. 75-81
2. Eftimie, M., Gruescu, C., Nicoară, I., *Algorithm for the Optimization of Closed-Loop Mechanical Circuit and Automated Calculus Using Original Software*, Scientific Bulletin of the "Politehnica" University of Timișoara, Transactions on Mechanics, tom 50(65), 2005, ISSN 1224-6077, pp. 96-101
3. Gruescu, C., Eftimie, M., Nicoară, I., *Comparative Study of Closed-Loop Test Circuits Regarding the Transmission Pairs Number*, Scientific Bulletin of the "Politehnica" University of Timișoara, Transactions on Mechanics, tom 50(65), 2005, ISSN 1224-6077, pp. 55-61
4. Gruescu, C., Nicoara, I., Pugna, A., *Cumulated Effect of Manufacturing and Mounting Errors on Image Quality of Diffraction Limited Optical Systems*, 2nd Int. Conference, Virtual Design and Automation Centre, VIDA 2005, 28-29. Nov, Poznan, Poland, CD_ROM edition
5. Gruescu, C., Nicoară, I., Hora, H., *Study Regarding the Influence of Mounting Clearance on Image Quality of Optomechanical Systems*, 2nd Int. Conference Virtual Design and Automation Centre, VIDA 2005, 28-29 Nov, Poznan, Poland, CD_ROM edition
6. Gruescu, C., Străuți-Negru, G., Costache, M., *Uncertainty in Optical Products Choise*, IXth Int. Symposium on Management, SIM 2005, CD_ROM edition
7. Străuți-Negru, G., Gruescu, C., Hora, H., *Image Quality Parameters-Basic Criteria in Optical Products Choise*, IXth Int. Symposium on Management, SIM 2005, CD_ROM edition
8. Fernengel, V., Ianoși, E., Hoța, H., *Multifunctional data acquisition system using the LPT port*, 11th Int. Conference on Vibration Engineering, Timișoara, 27-30 Sept. 2005, Scientific Bulletin of the „Politehnica” University of Timișoara, Tom 50(64), ISSN 1224-6077, pp.33-36
9. Fernengel, V., Ianoși, E., Hoța, H., *Software for multifunctional data acquisition system applied in the dialysis process*, 11th Int. Conference on Vibration Engineering, Timișoara, 27-30 Sept. 2005, Scientific Bulletin of the „Politehnica” University of Timișoara, Tom 50(64), ISSN 1224-6077, pp. 37-40
10. Ianoși, E., Mateaș, M., *Considerations about performance evaluation of industrial robots*, Interdisciplinarity in Engineering, Int. scientific conference, Nov. 2005, Târgu Mures (Technological engineering, assembly utilities and equipment in machine building, Economy-economic engineering, Mechatronics), ISBN 973-8084-81-4, pp. 45-51
11. Mateaș, M., Ianoși, E., *The determination of same quality indicators for a group of industrial robots*, Interdisciplinarity in Engineering Int. scientific conference, Nov. 2005, Târgu Mures, (Technological engineering, assembly utilities and equipment in machine building, Economy-economic engineering, Mechatronics), ISBN 973-8084-81-4, pp. 45-51
12. Ianoși, E., *Considerations about the quality management system in the medical centers*, INGIMED 2005, Bucharest, Nov. 2005, ISBN 973-8408-11-3, pp. 50-56
13. Ianoși, E., *Considerations about the quality management system in the dialysis process*, INGIMED 2005, Bucharest, Nov. 2005, ISBN 973-8408-11-3, pp. 85-91
14. Mateaș, M., Ianoși, E., *New independent criteria for the performance evaluation of the industrial robots*, Experimental validation, Robotics & Management Journal, 2005, ISSN 1453-2069, pp. 45-49
15. Jula, M., Mădăras, L., *About the Pulling Capacity of Tangential Flat Belt Drives*, IFToMM Symposium SYROM'05, 2005, ISBN 793-718-289-8, pp. 75-79
16. Lovasz, E., Mateaș, M., Micea, M., *Determination of the human spine Geometry with CCD-camera*, Humboldt Symposium, 2005, ISBN 973-625-204-3, pp.292-295
17. Lovasz, E., Perju, D., Căraș, I., Zăbavă, E., Modler, K.H., *On the synthesis of the Cam mechanisms with tangential oscillating follower*, International IFToMM Symposium SYROM'05, 2005, ISBN 793-718-289-8, pp. 81-86

18. Perju, D., Lovasz, E., Modler, K.H., *On the Double action mechanisms*, International IFToMM Symposium SYROM'05, 2005, ISBN 793-718-289-8, pp. 117-122
19. Modler, K.H., Mărgineanu, D., Perju, D., Lovasz, E., Fernengel, V., *Analysis of mobile mechanical structures, (Analyse mechanische Strukturen für einfache Fortbewegungen)* International IFToMM Symposium SYROM'05, 2005, ISBN 793-718-289-8, pp. 105-110
20. Modler, K.H., Lovasz, E., Freitag, H., Hagedorn, J., Perju, D., Mărgineanu, D., *Applications of the serially connected mechanisms in the assembling automates, (Praxisorientierte Anwendung von nachgeschalteten Getrieben in Montageautomaten)*, Internationales Wissenschaftliches Kolloquium, Technische Universität Ilmenau, 19-23 Sept. 2005, ISBN 3-932633-98-9, pp. 377-378 + exteso CD-ROM
21. Lovasz, E., Modler, K.H., Cărăbaș, I., *International Cooperation between PU Timișoara and TU Dresden in the area of the mechanism theory*, Internationale Zusammenarbeit zwischen PU Timișoara und TU Dresden auf dem Gebiet der Getriebelehre Getriebekolloquium 2005, RWTH Aachen, 2005, ISBN 3-86130-773-1, pp. 179-192
22. Ciupe, V., Diaconu, A., Maniu, I. *Method of Enhancing the Control Capabilities of an Obsolete Hydraulic Robot Used in didactical Activities*, Robotica & Management Journal, Vol. 10, No. 1, March 2005, ISSN 1453-2069, pp. 21-24
23. Ciupe, V., Maniu, I., Grigorescu, S., *Internet-Based Visualization and Control of a Flexible Modular Production System*, Proceedings of the 14th International Workshop on Robotics in Alpe-Adria-Danube Region RAAD, May 26-29, 2005, Bucharest, ISBN 973-718-214-3, pp. 102-105
24. Grigorescu, S., Curtean, A., Maniu, I., Ciupe, V., *Simulation of Festo Modular Production System*, International Conference on Integrated Engineering, 16-18 Oct. 2005, Timisoara, ISBN 973-625-259-0, pp. 88-91
25. Chiciudean, D., Micea, M., Lovasz, E., Mateas, M., *Real-Time Person Tracking Video System*, Scientific Bulletin of the "Politehnica" University of Timisoara, Transactions on Mechanics, Vol. 50(64), Special Issue dedicated to the 11th International Conference of Vibration Engineering, Timisoara, Romania, Sept. 2005, ISSN 1224-6077, pp. 9-14
26. Davidescu, A., Sticlaru, C., *Parametric Design of a Gear Pair in ProEngineer*, 9th IFToMM International Symposium on Theory of Machines and Mechanisms, Bucharest, 2005, ISBN 793-718-289-8, pp. 461-464
27. Davidescu, A., Savii, G., Sticlaru, C., *Analysis of HVOF-Sprayed MCrAlY Coatings Using SEM Image Processing*, Journal of Optoelectronics and Advanced Materials, ISSN 1454-4164, vol. 7, nr. 6, 2005, pp. 3107-3110
28. Sticlaru, C., Davidescu, A., Dolga, V., *Studies by Finite Element Method of Some Compliant Devices*, Trans & MotoAuto, Bulgaria, 2005 (PS III, 37), ISSN 0025-455X, pp. 45-49
29. Dolga, V., Sticlaru, C., Davidescu, A., *The Influence of Load Conditions upon Compliant Devices*, International Conference Research and Development in Mechanical Industry, RaDMI 2005, ISBN 86-83803-18-X, pp. 92-96
30. Sticlaru, C., Davidescu, A., Mesaroș-Anghel, V., *Studies on kinematic modeling of planar linkages*, 9th IFToMM International Symposium on Theory of Machines and Mechanisms, Bucharest, 2005, ISBN 793-718-289-8, pp. 183-188
31. Dehelean, N., Dehelean, L., *Influența ecologiei asupra construcției de mașini*, National Seminar "Organe de Mașini – Ecodesign", XXVth edition, Transilvania Univ. of Brașov, 2005, ISBN 973-635-520-9, pp. 37-42
32. Cioi, D., *Virtual reality modelling for educational robot systems*, Proceedings of RAAD'05, 14th International Workshop on Robotics in Alpe-Adria-Danube Region, Bucharest, May 26-28, 2005, ISBN 973-718-214-3, pp. 225-228
33. Mesaros-Anghel, V., Carabas, I., *Un cylindre pneumatique a fil auquel on peut regler le temps ou s'effectue la course*, Robotics & Management Journal, vol.10, nr. 1 / 2005, ISSN 1453-2069, pp.41-44
34. Mesaros-Anghel, V., Madaras, L., *Un cylindre pneumatique plus leger que les classiquees*, Robotics & Management Journal, vol. 10, nr. 1 / 2005, ISSN 1453-2069, pp. 45-47
35. Argesanu, V., Mesaros-Anghel, V., Madaras, L., *On the Priority of the Modulus Versus the Center Distance Predimensioning of the Evolventical Gear Calculus*, 9th IFToMM International Symposium on Theory of Machines and Mechanisms, Bucharest, Sept. 1-4, 2005, vol. II, ISBN 793-718-289-8, pp. 307-312

GRANTS / RESEARCH PROGRAMS

1. *Studies on development of a remote mechatronic laboratory*, grant type A, code CNCISIS 162, Director: lect.dr.eng. Diaconu Aurel, Value for 2005: 13.500 RON
2. *Automatic data acquisition system for the quantification of the dialysis process efficiency*, grant CNCISIS – AT / 70 /27688 / 2005, Director: assist.dr.eng. Ianosi Endre, Value for 2005: 8.000 RON
3. *Researches on using the robotic systems for the enhancement of the technical and economical competitiveness in Romanian industry*, 21 CEE X I 03 / 07.10.2005, Director: prof.dr.eng. Maniu Inocențiu, Value for 2005: 550.000 RON
4. *Nanomaterials with controlled porosity and magnetic & optical properties, obtained by sol-gel and sono-synthesis method, with potential applications in environment protection, biology and medicine*, CEE X P-CD/98-9-11750, Director: prof.dr.eng. Savii George, Value for 2005: 10.000 RON
5. *Skill-based Inspection and Assembly for Reconfigurable Automation Systems*, FP6 / NMP2-CT-2005/017146, Director: prof.dr.eng. Savii George, Value for 2005: 120.000 RON

PhD THESIS

1. Bodea Raneta: *Contributions concerning synthesis of optical assemblies corrected for chromatic aberrations and secondary spectrum*, scientific supervisor: prof.dr.eng. Ioan Nicoara
2. Pugna Adrian Pavel: *Researches concerning robust Taguchi design of growing process by hydrothermal method for alpha-quartz monocrystals*, scientific supervisor: prof.dr. eng. Ioan Nicoara
3. Strauti-Negru Gabriela: *Correlation between image quality parameters and manufacturing and mounting technology of optomechanical systems*, scientific supervisor: prof.dr.eng. Ioan Nicoara
4. Săbăilă Lavinia Ioana: *Robotics systems for manipulating and storage of bottle gas*, scientific supervisor: prof.dr.eng. Francisc Kovacs
5. Dragomir Radu Mircea: *Contributions concerning optimal synthesis of casting flexible manufacturing systems*, scientific supervisor: prof.dr.eng. Francisc Kovacs
6. Vesselenyi Tiberiu: *Automation of metallographic analysis*, scientific supervisor: prof.dr.eng. Francisc Kovacs

7. Mereș Marius: *Calibration of measuring devices for stress state of 2D elements*, scientific supervisor: prof.dr.eng. Dan Perju

PhD STUDENTS

1. Craciun Mihaela Daciana: *Information System for Credit Soliciting Companies Evaluation*, scientific supervisor: prof.dr.eng. George Savii
2. Șerban Sorina Gabriela: *Computer Aided Education in Chemistry*, scientific supervisor: prof.dr.eng. George Savii
3. Alba Claudio: *Information System for Remote Operation and Monitoring*, scientific supervisor: prof.dr.eng. George Savii
4. Visa Mircea: *Computer Aided Design of Composite Materials*, scientific supervisor: prof.dr.eng. George Savii
5. Cioi Daniel: *Virtual Reality for Computer Aided Design*, scientific supervisor: prof.dr. eng. George Savii
6. Uruioc Constantin: *Information System for Efficient Knowledge Transfer*, scientific supervisor: prof.dr.eng. George Savii
7. Penteliuc-Cotosman Dumitru: *Information System for Distance Learning*, scientific supervisor: prof.dr.eng. George Savii
8. Mioc Mirella: *Medical Applications Oriented Knowledge Bases*, scientific supervisor: prof. dr.eng. George Savii
9. Hoanca Radu: *Information System for Integrated Production Management*, scientific supervisor: prof.dr.eng. George Savii
10. Gyiman Carmen: *Expert System for Production Management*, scientific supervisor: prof.dr.eng. George Savii
11. Alba Lavinia: *Teleoperated servicerobot over Internet*, scientific supervisor: prof.mhc.dr. eng. Francisc Kovacs
12. Vatau Steliana: *Optimizing functional construction of quadruped walking robot*, scientific supervisor: prof.mhc.dr.eng. Francisc Kovacs
13. Dragotoiu Oana: *Optimal solution to finance robotics flexibles manufacturing systems investments*, scientific supervisor: prof.mhc.dr. eng. Francisc Kovacs
14. Ursu Gabriel Vasile, *Contributions at elastic joint parameters optimization and the influence of elastic joint upon turn running of locomotive articulate bogie*, prof. dr. eng. Lucian Mădăras

15. Rusu Octav, *Studies about performance of railway apparatus for high speed trains*, prof. dr. eng. Lucian Mădăras;
16. Ostoia Daniel, *Studies about forming of mixture and afterburning control upon working behavior in burning chamber in correlation with emission controlled engine regime for Diesel motor*, prof. dr. eng. Lucian Mădăras;
17. Dungan Luiza, *Contributions at study and research upon flexi coil spring from electrical locomotive CFR 060-EA 5100 kW*, prof. dr. eng. Lucian Mădăras;
18. Vlăduceanu Samuel, *Contributions upon functional and constructional brake disk for high speed vehicles*, prof. dr. eng. Lucian Mădăras;
19. Vela Daniel Gheorghe, *Contributions at functional and constructional development of harmonic drive*, prof. dr. eng. Lucian Mădăras;
20. Olaru Mihai, *Contributions concerning risk improvement stabilization in traffic safety*, prof. dr. eng. Lucian Mădăras;
21. Marinca Petru, *Contributions concerning functional and constructional development of direction and brake mechanisms for vehicles*, prof. dr. eng. Lucian Mădăras;
22. Hotea Adriana, *Contributions to optimal synthesis of cams mechanisms*, prof. dr. eng. Dan Perju;
23. Zăbavă Eugen Sever, *Contributions to synthesis of cam mechanisms with tangential follower*, prof. dr. eng. Dan Perju;
24. Moldovan Cristian, *Study of centroidal type mechanisms*, prof. dr. eng. Dan Perju;
25. Ciorogar Ciprian Alin, *Contributions to improving the quality of the measuring instruments/apparatus of register type*, prof. dr. eng. Dan Perju;
26. Lupa Florin Sebastian, *Contributions to optimum synthesis of linkage and cam mechanisms*, prof. dr. eng. Dan Perju;
27. Raicov Radoslav, *Study of laser cutting processes for improving their quality and of the products*, prof. dr. eng. Dan Perju;
28. Pop Ioan Adrian, *Special mechanical transmissions*, prof. dr. eng. Dan Perju.

RESEARCH CENTRE FOR THERMAL MACHINES AND EQUIPMENT, TRANSPORTATION AND POLLUTION CONTROL

GENERAL PRESENTATION

This research centre was approved by the National Council for University Research in 2001 (**CNCSIS Certificate 70/CC/C/2001**), based on the application made by the Department of Thermal Machines and Transportation, being recognized for the following main research fields:

- Thermal machines and equipment
- Environmental protection
- Transport vehicles

The research team include the members of the founding chairs of the Department:

- ✓ Chair of Thermodynamics, Thermal Machines and Road Vehicles
 - ✓ Chair of Railway Rolling Stock,
- as well as associated researchers and PhD & master students.

Category	Under 35 years		Between 35 and 45 years		Over 46 years	
	Fem	Male	Fem	Male	Fem	Male
Total	3	16	1	4	3	13
PhD title holders	1	2	1	5	2	12
PhD students	3	7	-	-	1	1
Teaching personnel (full-time)	2	3	1	5	3	12
Research personnel (part-time) from RO/ from abroad	2/-	12/-		1/-	-/-	1/-

CONTACT

Director: Prof. dr. eng. Virgiliu D. NEGREA, corresponding member of the Romanian Academy for Technical Sciences

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MISSION

- To promote its main expertise fields, by means of research projects & university curricula, by fundamental & applied, industrial, lab scaled & numerical simulations research, by offering expertise & consultancy, by performing educational activities at undergraduate & graduate level, doctoral training, and post-university or expert training;
- To develop a self-financement budget by applying for research fundings, completion of basic equipment and additional activities (conferences, publications);
- To organize workshops, conferences, summer schools and other training modalities.
- To penetrate in the european research network and establish/apply/receive dissemination of high level curricula and R&D fields.
- To enlarge the thematic offer and activities.

Researches in INTERNAL COMBUSTION ENGINES (ICEs) AND FUEL CELLS

Keywords: spark-ignition engine, diesel engine, heat flow, carburetor hot spot, compression rate, heat exchanger, mixture formation, combustion process, numerical evaluation of pollutants, fuel cell, energy use reduction, emission reduction

Activities:

- experimental researches regarding the operation, the level of pollution and energetic performance of ICEs using gaseous fuels
- experimental researches regarding the endurance and reliability qualities of ICEs
- experimental researches regarding the thermo-mechanical stresses in the ICEs sub-units
- numerical evaluation of the mixture formation and the combustion process, based on the fuel drops evolution (Diesel engines)
- numerical evaluation of pollutants

- calculation of the energetic and ecological performances for ICEs using gaseous fuels
- Studies regarding the use of fuel cells to reduce energy use and emissions for transportation and stationary power applications

RESEARCH PROJECTS

1. CNCSIS grant, A type, CNCSIS Code 548, Contr. No. 27688/14.03.2005, *Researches regarding the operating - constructive optimization and ecological impact of thermal machines and equipments and of transportation vehicles*, Director: Prof.dr.eng. Virgiliu Dan Negrea, Value: 7,500 RON
2. CEEEX grant AMTRANS, Contr. No. X1CO1 / 2005, *The possibilities and limitations of the ecologisation of urban traffic by using fuels obtained from vegetable oils*, Director UPT (Partner): Assoc.prof.dr.eng. Liviu Mihon, Value: 4,000 RON

PUBLICATIONS

BOOKS

1. Virgiliu Dan Negrea, *Basics of experimental research of internal combustion engines and road vehicles* (published in Romanian), Vol I, Eurostampa Publishing House, ISBN 973-687-310-2, ISBN-973-687-311-0, 2005, second edition, 268 pages
2. Virgiliu Dan Negrea, *Basics of experimental research of internal combustion engines and road vehicles* (published in Romanian), Vol II, Eurostampa Publishing House, ISBN 973-687-310-2, ISBN-973-687-312-9, 2005, second edition, 265 pages

PUBLISHED PAPERS

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2. Negrea, V.D., Ivan, F., *Erzielte Ergebnisse bei Versuche von Verbrennungskammern des Typs Heron mit geringe Noxen*, Symposium "Man and the Environment", 4th edition, Timișoara, CD-ROM Proceedings, May 26, 2005, Politehnica Publishing House, ISBN 973-625-225-6, pp. 23-26
3. Negrea, V.D., Dincă, F., Pădure, G., Holotescu, S., *Evoluția temperaturii în regim nestaționar pentru pistonul unui motor diesel cu injecție indirectă*, National Conference of Thermodynamics with international participation, XVth Edition, May 26-28, 2005,

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4. Negrea, V.D., Grigore, L., Pădure, G., Mihon, L., *Diesel injection pump elements analyses with finite element method*, CAR 2005 International Congress, November 2-4, 2005, ISBN 973-690-450-4
 5. Negrea, V.D., Grigore, L., Mihon, L., Pădure, G., *Fuel pipe-injector assembly modelation with finite element method*, CAR 2005 International Congress, November 2-4, 2005, ISBN 973-690-450-4
 6. Negrea, V.D., *Cercetări privind implicațiile motoarelor cu ardere internă asupra poluării și aspecte legate de perfecționarea constructiv-funcțională a acestor mașini*, Symposium “30 years MASTER S.A.”, Bucharest, December 7-8, 2005
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 12. Iorga, D., Vrabie, I., Pădure, G., Ostoia, D., *Improving possibilities of the spraying qualities of the injection system of a high power diesel engine with unitary combustion chamber*, Scientific Reunion of the Alexander von Humboldt Foundation concerning the Reconstruction of the Eastern Europe “Sustainability for Humanity & Environment in the Extended Connection Field of Science-Economy-Policy”, Politehnica Publishing House, Timișoara, 24-25 Febr. 2005, ISBN 973-625-205-1, pp.409-412
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 14. Iorga, D., Vrabie, I., Pădure, G., Ostoia, D., *Cercetări experimentale privind influența combinată a modificărilor presiunii de injecție și a numărului orificiilor pulverizatorului asupra caracteristicilor pulverizării*, Symposium “Man and the Environment”, 4th edition, Timișoara, CD-ROM Proceedings, May 26, 2005, Politehnica Publishing House, ISBN 973-625-225-6, pp. 44-47
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 17. Mihon, L., *Critical Study Concerning Fuel Cell Applications in Automotive Technology*, Scientific Reunion of the Alexander von Humboldt Foundation concerning the Reconstruction of the Eastern Europe “Sustainability for Humanity & Environment in the Extended Connection Field of Science-Economy-Policy”, Vol.I, ISBN 973-625-205-1, pp. 228-231
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20. Holotescu, S., Stoian, F.D., *Model pentru simularea funcționării unui regulator mecanic ce echipează pompa de injecție a unui motor diesel*, Symposium "Man and the Environment", 4th edition, Timișoara, CD-ROM Proceedings, May 26, 2005, Politehnica Publishing House, ISBN 973 625 225 6, pp. 136-143
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24. Negoîtescu, A.S., Ostoia, D., *Aspecte privind sistemele alternative de producere combinată a energiei electrice și termice*, National Conference of Thermodynamics with international participation, XVth edition, May 26-28, 2005, CD-ROM Proceedings, Craiova, ISBN 973-742-089-6
25. Ostoia, D., Negoîtescu, A.S., *A Study Regarding the Combustion Chambers Behaviour in Corelation with Emitted Noxes at Diesel Engines*, 30th Annual Congress of the American Romanian Academy of Arts and Sciences (ARA), Academy of Economic Studies of Moldova, Chișinău, Moldavia, 5-10 July, 2005, ISBN 9975-75-313-2, pp. 576-578
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27. Ostoia, D., Holotescu, S., Petruțesc-Boaru, L.S., *Studiu privind creșterea de presiune pe ciclul și opacitatea pe caracteristica de mers în gol a unui monocilindru diesel*, Symposium "Man and the Environment", 4th edition, Timișoara, CD-ROM Proceedings, May 26, 2005, Politehnica Publishing House, ISBN 973-625-225-6, pp. 150-155
28. Petruțesc-Boaru, L.S., Negrea, V.D., Petruțesc-Boaru, C.C., *Calculul coeficienților ponderați de toxicitate pentru motoare cu ardere internă de tracțiune rutieră*, NAV-MAR-EDU-2005 with international participation, XIXth edition, June 2-4, 2005, "Mircea Cel Bătrân" Naval Academy Publishing House, CD-ROM Proceedings, Constanța, ISBN 973-8303-56-7
29. Petruțesc-Boaru, L.S., Petruțesc-Boaru, C.C., *Cu privire la efectul poluant al substanțelor existente în atmosferă și a concentrațiilor de noxe cu efect global*, Symposium "Man and the Environment", 4th edition, Timișoara, CD-ROM Proceedings, May 26, 2005, Politehnica Publishing House, ISBN 973 625 225 6, pp.163-167
30. Mihon, D., Pap, P., Mihon, L., *The analyse and modelation of the man-vehicle reliability in the transport net*, 36th International Scientific Symposium of METRA, Bucharest, 26-27 May, 2005, Vol.I, ISBN 973-0-03923-2, pp. 123-128
31. Pesic, R., Milojevic, S., Davinic, A., Negrea, V.D., Pop, Gh., *The experimental VCR Diesel engine and determination of double Vibe function parameters*, CAR 2005, Nov. 2-4, 2005, ISBN 973-690-450-4
32. Pap, P., Mihon, D., Mihon, L., *Frame methodology for conception and realisation of flow microsimulation model in communication nets*, 36th International Scientific Symposium of METRA, Bucharest, 26-27 May, 2005, Vol.I, ISBN 973-0-03923-2, pp. 164-167

PERSPECTIVES

Development of the Laboratory for Processes in Internal Combustion Engines

PhD STUDENTS

PhD Supervisor: Prof.dr.eng. Virgiliu Dan Negrea

1. Eng. Sandu IONESCU: *Studies and researches regarding the heat transfer enhancement in heat exchangers with discontinuous fins*
2. Eng. Dan GOMBOS: *Studies and researches regarding the use of waste heat of geothermal water*
3. Eng. Liviu Mircea POINARIU: *Studies and researches regarding the conditions and accuracy of measurement of the performance parameters for electronically controlled spark-ignition engines*
4. Eng. Florean DRUGA: *Contributions regarding the constructive and operational optimisation of medium and large power engines for road vehicles*
5. Eng. Cristian Dumitru BOZAN: *Researches regarding the performance control level for a supercharged diesel engine by the improvement of intermediate cooler constructive and operational characteristics*
6. Eng. Adela FILIP: *Studies and researches regarding the improvement of thermo-mechanical performances of components made by sinterization from atomic clusters with application to internal combustion engines*
7. Eng. Radu THUMA BRANZEAZU: *Contributions regarding the pollutants control for very high pressure direct injection diesel engine*
8. Eng. Radu MARIAN: *Researches regarding the low power diesel engines performances with the use of double injection*
9. Eng. Ferencz VOLLONCS: *Researches regarding the effects of the fittings made between technical inspections on the technical and operational performances and the level of pollutants of urban road vehicles*
10. Eng. Narcis Petru URICANU: *Studies and researches regarding the level of pollutants measured at the cars technical inspection, as a function of their type, duration and conditions of operation*
11. Eng. Radu Iuliu COVACI: *Researches regarding the constructive and operational optimisation of a diesel engine from the point of view of the energetic and pollution performances*
12. Eng. Lăcrămioara Suzana PETRUȚESC-BOARU: *Studies and researches regarding the pollutants control for an internal combustion engine in interaction with the automobile which is equipped with it*

13. Eng. Florian Călin NEGRUTIU: *Contributions regarding the pollutants evaluation in connection with the conditions of operation for heavy vehicles equipped with high pressure direct injection diesel engines*
14. Eng. Adriana TOKAR: *Researches regarding the interaction between the automobile equipped with internal combustion engine and the environment*
15. Mariana Dora FORTOFOI: *Researches regarding the systemic-cybernetic approach of the traffic on public roads, in correlation with the civil, criminal and administrative responsibility*
16. Alexandra Ana GARBONI: *Researches regarding the implications of harmful factors on the environment quality in the western part of Romania*
17. Lucian Ioan RAFAN: *The phenomenon accident in correlation with the environment protection*
18. Eng. Silviu Vasile PONORAN: *Road traffic and environmental pollution*
19. Eng. George DRAGOMIR: *Researches regarding the constructive and operational improvement of a road vehicle internal combustion engine, in correlation with the process of construction and the adjustment to the road conditions and pollution control*

PhD Supervisor: Prof.dr.eng. Daniel IORGA

1. Eng. Ion VRABIE: *Contributions regarding the improvement of the energetic performances and pollution limitation for a medium-high power direct injection diesel engine, through the improvement of the injection quality*
2. Cristian NEGHINA: *Contributions regarding the optimisation of the methods and techniques used to raise the quality level in the criminological activities through the thermo-mechanical control of ballistics*
3. Eng. Radu HORATIU: *Studies and researches regarding the conditions for mixture formation through injection in the valve port of a spark-ignition engine, related to the engine performances and the level of stresses*
4. Eng. Călin MOLDOVEANU: *Researches regarding the energetic performances and the pollution reduction for a direct injection diesel engine using a system of high pressure injection pressure*
5. Eng. Daniel PICIOREA: *Contributions to the adjustment of an injection system to use unconventional liquid fuels for a direct injection diesel engine*

6. Eng. Ludovic BAKOS: *Contributions to the analysis of the causes and effects of the road accidents from Arad county and methods of limiting it*

RESEARCH TEAM

- Prof.dr.eng. Virgiliu Dan NEGREA
- Prof.dr.eng. Daniel IORGA
- Prof.dr.eng. Traian RAICA
- Assoc.prof.dr.eng. Liviu MIHON
- Lect.dr.eng. Andrei FERENCZ
- Lect.dr.eng. Gelu PADURE
- Lect.dr.eng. Sorin HOLOTESCU
- Lect.dr.eng. Gheorghe POP
- Lect.dr.eng. Arina Speranța NEGOIȚESCU
- Assist.eng. Virgil STOICA
- Assist.eng. Daniel OSTOIA
- Eng. Lăcrămioara Suzana PETRUTESCU-BOARU, PhD student
- Eng. Adriana TOKAR, PhD student
- Eng. Ileana NEGREA, PhD student

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Researches in COMBUSTION PROCESS & COMBUSTION FACILITIES FOR CLASSIC AND RENEWABLE FUEL SOURCES,, TECHNOLOGIES FOR THE REDUCTION OF POLLUTING IMPACT OF THE THERMAL MACHINES AND VEHICLES ON THE ENVIRONMENT, AIR QUALITY MONITORING

Keywords: *classic and renewable fuels, waste, biomass, burners, boilers, combustion efficiency and control, pollutant emissions, air quality, thermal and environmental balances.*

ACTIVITIES

- Environmental on line measurements, with attested methods (emissions and air quality), in real time data acquisition for CO, SO₂, NO_x, C_mH_n, combustion quality, including meteorological data
- Hg measurements
- Waste management (combustion) and flue gas cleaning
- Optical & classical methods for air quality investigation

- Optimization of energy production & transmission (power plants), using fossil and renewable fuels
- Numerical simulation of the pollutant dispersion, using various statistical methods, regarding the stationary combustion installations (boilers, furnaces etc.) and mobile combustion installations (vehicles equipped with ICEs: ISC3 View, Caline 3, Emisfac, Cal3qhc)
- Numerical experiments regarding the optimization of combustion installations by modelling of the velocity, temperature and concentration fields in the furnaces of boiler using the FLUENT program package
- The ecological evaluation (with attestation of ISCIR, the Romanian Authority for Safety of Boilers and Pressurized Installations) of the stationary and mobile combustion sources (burners, heaters, furnaces, ICEs) by experimental and theoretical researches, taking into consideration their toxicological effects;
- Energetic and ecological optimization of low quality coal, heavy oils and alternative fuels (such as domestic waste, biomass etc.) combustion process by experiments;
- Experimental researches regarding the performance indicators, safety and pollution level for small boilers (for individual heating systems);
- Thermal balances for simple or complex thermal installations, with proposals for optimization.

RESULTS

RESEARCH PROJECTS / CONTRACTS

1. EU project, NNES-2001-00719, *Unification of power plant and solid waste incineration UPSWING*, Director: Prof.dr.eng.habil Ioana Ionel, Value for 2005: 28,000 EUR
2. EU Project, G6RD/CT/2000/00434, *Remote Optical Sensing ROSE*, Director: Prof.dr.eng.habil Ioana Ionel, Value for 2005: 2,000 EUR
3. Contract No P137 *Experts in Balkan region - CETEOR*, Director: Prof.dr.eng.habil Ioana Ionel, Value for 2005: 3,286 RON
4. Contract COLL CT 2005 012566, 2005-2007, *GREENENERGY (Energy optimisation in European greenhouses)*, Director: Prof.dr.eng.habil Ioana Ionel, Value for 2005: 16,100 RON
5. Contract-Nr. CT SES6-CT-020007 2005-2006, *NETBIOCOF (Network of biomass cofiring)*, Director: Prof.dr.eng.habil Ioana Ionel, Value for 2005: 7,000 EUR

6. CNCSIS grant, A type, CNCSIS Code 548, Contr. Nr. 27688 / 14.03.2005, *Researches regarding the operating - constructive optimization and ecological impact of thermal machines and equipments and of transportation vehicles*, Director: Prof.dr.eng. Virgiliu Dan Negrea. The topic: *Researches regarding the reduction of the energetic consumption in transportation. Energetic cycles with low pollutant emissions*, Topic responsible: Prof.dr.eng.habil Ioana Ionel, topic value 7,500 RON
7. CNCSIS Research Fellowship no. 176/2003, *Contributions to the determination of the combustion quality of waste and methods of reduction the pollutant emissions concentrations*, Eng. Claudiu Gruescu, PhD Student, Value: 264 RON/month
8. National Research Program MENER, contract no. 410 / 20.09.2004 (continued in 2005), *Researches regarding the combined combustion of urban waste or biomass with coal and flue gas cleaning*, Director: Prof.dr.eng.habil Ioana Ionel, value 28,500 RON
9. National Research Program MENER, contract no. 461/20.09.2004, *New technology of valorification of biomass by combustion in fluidised bed*, Director: Prof.dr.eng.habil Ioana Ionel, value for 2005: 6,000 RON
10. Contract 42 / 4.XI 2003 with the Ministry of Education and Research, the Development & Research Fund, *Implementation of a solid waste incinerator in a thermal power plant*, Director: Prof.dr.eng.habil Ioana Ionel, value for 2005: 12,900 RON
11. Contract No. 278/15.06 2005 with Detergenti S.A. Procter&Gamble Timisoara, 2005-2006, *Measurement of pollutant emissions at 4 installations and 10 points and evaluation of dispersion*, Director: Prof.dr.eng. Corneliu Ungureanu, value 5,135 RON + 125 EUR
12. Contract No. 1217 / 2005-2006 with SOLECTRON, *Measurement of emissions in order to evaluate the impact on the environment*, Director: Prof.dr.eng.habil Ioana Ionel, value 250 EUR
13. CEEX Program, Contract No. 12233 / 12.10.2005, *Development of clean technologies to produce energy based on coal TECEBAC*, Director: Prof.dr.eng.habil Ioana Ionel, value 30,000 RON
14. COBIL Program 2005-2007, *Co-firing of biomass and municipal solid waste with coal and flue gas cleaning*, Romanian Partners: UPT/coordinator, ISPE Bucharest, SAVRPOD Bucharest, Hungarian Budapest University of Technology and Economics, Department of Process Engineering, TERRA HUMANA Clean Technology Engineering Ltd., Director: Prof.dr.eng.habil Ioana Ionel, Value: 12,786 RON
15. CNCSIS grant, CNCSIS Code 54, *Simulation in FLUENT Code of the temperature and velocity fields in a furnace for simultaneous burning of the wastes and powder coal*, Director: Eng. Vasile Gruescu, PhD Student, Value for 2005: 18,060 RON
16. *Alexander von Humboldt Foundation Grant* for funding of the Scientific Reunion of the Alexander von Humboldt Foundation concerning the Reconstruction of the Eastern Europe "Sustainability for Humanity & Environment in the Extended Connection Field Science-Economy-Policy, Prof.dr.eng.habil Ioana Ionel, Value: 20,000 EUR
17. *Ministry of Education and Research Grant* for co-funding of the Scientific Reunion of the Alexander von Humboldt Foundation concerning the Reconstruction of the Eastern Europe "Sustainability for Humanity & Environment in the Extended Connection Field Science-Economy-Policy, value: 10,000 RON

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4. Ionel, I., Ionel, S., *Correlation analysis for traffic induced pollution*, JUMV 20th-International Congress, Belgrade, Serbia and Montenegro, European Automotive Congress, Session Ecology and Environment, CD presentation ISBN 86 80941-30-1, Print at DADA Belgrade, Publisher JUMV, 30.05-01.06 2005, Paper EE03

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8. Ungureanu, C., Raica, T., Ionel, I., Popescu, Fr., *De ce cogenerare?*, National Conference with international participation "Installations for buildings and ambietal comfort", 14th Edition, 14-15 April, 2005, ISBN 973-625-223-X, pp. 166-169
9. Ionel, I., *Achievements concerning the UPSWING concept for coupling of a waste incinerator to a Romanian coal fired steam boiler*, 30th Annual ARA Congress, Chisinau, Moldavia, July 2005, ISBN 9975-75-313-2, pp. 628-631
10. Ionel, I., *Environmental concern & global risks of the mercury emission sources*, Wastes & Biomass Thermal Treatment, Combustion & Co-Combustion - Workshop, 16-17 Nov., 2005, Wroclaw University of Technology, Poland, ISBN 83-7085-908-9
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13. Oprisa-Stanescu, D.P., Ionel, I., *Air staging as NO_x reduction method for gas and oil combustion facilities*, ISTP-16, 16th International Symposium on Transport Phenomena, Prague, Czech Republic, Aug. 29 - Sept. 1, 2005, ISBN 80-86786-04-8, pp. 134
14. Ionel, I., *A new challenge*, Scientific Reunion of the Alexander von Humboldt Foundation concerning the Reconstruction of the Eastern Europe "Sustainability for Humanity & Environment in the Extended Connection Field Science-Economy-Policy", Politehnica Publishing House, Timișoara, 24-25 Febr., 2005, ISBN 973-625-205-1, pp.13-16
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16. Ionel, I., *Achievements and future development trends of the department of thermal machines, power engineering facilities and transportation, in the extended field of renewable energies*, "Renewable Energies for Europe – Research in Action". Poster presentation, Brussels, 21/22 Nov. 2005, Poster A1
17. Oprisa-Stanescu, D.P., *About the possibilities of dioxin decomposition passing through a steam boiler furnace*, Scientific Reunion of the Alexander von Humboldt Foundation concerning the Reconstruction of the Eastern Europe "Sustainability for Humanity & Environment in the Extended Connection Field Science-Economy-Policy", Politehnica Publishing House, Timișoara, 24-25 Febr., 2005, ISBN 973-625-205-1, pp. 219-222
18. Ionel, I., Bisorca, D., Popescu, Fr., *Results of the ROSE project concerning the CO concentration in Timisoara*, Scientific Reunion of the Alexander von Humboldt Foundation concerning the Reconstruction of the Eastern Europe "Sustainability for Humanity & Environment in the Extended Connection Field Science-Economy-Policy", Politehnica Publishing House, Timișoara, 24-25 Febr., 2005, ISBN 973-625-205-1, pp. 111-114
19. Bakk, E., Heiden, B., Sturm, P., Ionel, I., *Coagulation measurement device (CMD)*

- prototype*, Symposium “Man and the Environment”, 4th edition, Timișoara, CD-ROM Proceedings, May 26, 2005, Politehnica Publishing House, ISBN 973-625-225-6, pp. 173-178
20. Gruescu, V., Maier, J., Moenkert, P., Ionel, I., *Oxy fuel combustion as a method for reducing CO₂ from flue gases. Experimental investigations*, Symposium “Man and the Environment”, 4th edition, Timișoara, CD-ROM Proceedings, May 26, 2005, Politehnica Publishing House, ISBN 973 625 225 6, pp. 91-100
 21. Țirziu, C., Meier, J., Ionel, I., *Solarkollektor Fuer Wassererwaermung*, Scientific Reunion of the Alexander von Humboldt Foundation concerning the Reconstruction of the Eastern Europe “Sustainability for Humanity & Environment in the Extended Connection Field Science-Economy-Policy”, Politehnica Publishing House, Timișoara, 24-25 Febr., 2005, ISBN 973-625-205-1, pp. 276-279
 22. Hilber, H., Russ, W., Ionel, I., *Cogenerarea, metoda de reducere motorul cu ardere interna al unei centrale termice in cogenerare*, Symposium “Man and the Environment”, 4th edition, Timișoara, CD-ROM Proceedings, May 26, 2005, Politehnica Publishing House, ISBN 973-625-225-6, pp. 101-107
 23. Savu, Al., Ionel, I., Gruescu, Cl., Trif Tordai, G., Savu, M., *Tehnologie de epurare a gazelor de ardere rezultate din incinerarea combinata*, Symposium “Man and the Environment”, 4th edition, Timișoara, CD-ROM Proceedings, May 26, 2005, Politehnica Publishing House, ISBN 973 625 225 6, pp. 77-82
 24. Gruescu, V., Tenchea, A., Ungureanu, C., *Analysis of Unconventional Fuels Based on the Thermo-Gravimetric Analysis Method*, Scientific Reunion of the Alexander von Humboldt Foundation concerning the Reconstruction of the Eastern Europe “Sustainability for Humanity & Environment in the Extended Connection Field Science-Economy-Policy”, Politehnica Publishing House, Timișoara, 24-25 Febr., 2005, ISBN 973-625-205-1, pp. 256-259
 25. Cîrtog, A., Ionel, I., Mochizuki, S., *Efectul câmpului electrostatic asupra comportamentului particulelor purtate de aer*, Proceedings of 6th International Power Systems Conference, Timisoara, 3-4 Nov., 2005, CD Section C4, publ. in Transaction on Power Engineering, U. P. Timisoara, ISBN 1582-7194, Fasc 1-2, Tom 50(64), 2005, pp. 120
 26. Gruescu, Cl., *Experimental research concerning the cleaning of the waste incineration flue gases*, Scientific Reunion of the Alexander von Humboldt Foundation concerning the Reconstruction of the Eastern Europe “Sustainability for Humanity & Environment in the Extended Connection Field Science-Economy-Policy”, Politehnica Publishing House, Timișoara, 24-25 Febr., 2005, ISBN 973-625-205-1, pp. 107-110
 27. Gruescu, Cl., *Experimental research on a wet scrubber lab facility for simultaneously removal of the heavy metals and other pollutants from the waste incinerator flue gases*, Wastes & Biomass Thermal Treatment, Combustion & Co-Combustion - Workshop, 16-17 Nov., 2005, Wrocław University of Technology, Poland, ISBN 83-7085-908-9
 28. Trif-Tordai, G., Tenchea, A., *Co-Firing of Biomass/Domestic Wastes with Coal and Flue Gas Cleaning*, Scientific Reunion of the Alexander von Humboldt Foundation concerning the Reconstruction of the Eastern Europe “Sustainability for Humanity & Environment in the Extended Connection Field Science-Economy-Policy”, Politehnica Publishing House, Timișoara, 24-25 Febr., 2005, ISBN 973-625-205-1, pp. 291-294

PhD THESIS

Eng. Daniel BISOACA, *Contributions to the air quality monitoring using high sensibility methods. Applications for the Timisoara city*, PhD supervisor: prof.dr.eng.habil Ioana Ionel

PhD STUDENTS

PhD supervisor: Prof.dr.eng. Corneliu Ungureanu

1. Eng. Aurel MATEI: *Contributions to the reduction of pollutant emissions as a result of the operation of Timisoara Power Plant*
2. Eng. Alexandru Anghel C. GHENEA: *Contributions to the study of efficiency measures regarding the durable development of Ișalnița Power Plant*
3. Eng. Lelia DOBJANSCHI: *Contributions regarding the share of ROMAG-TERMO Turnu Severin coal Power Plant to the zonal pollution and measures for reducing it*
4. Eng. Florica TUDOR: *Contributions regarding the diminution of environmental pollution due to the ash produced at the lignite combustion at Turceni Power Plant*

5. Eng. Marius MARIN: *Contributions regarding the diminution of environmental pollution due to gaseous pollutants produced due to the lignite combustion at Turceni Power Plant*
6. Eng. Vasile GRUESCU: *Contributions regarding the energo-technology of domestic and street waste*
7. Eng. Adrian Iulian TENCHEA: *Contributions regarding the research of the biomass combustion in fluidized bed*
8. Eng. Victor EBETIUC: *Studies and researches regarding the efficient production and distribution of thermal energy in Turnu Severin city*
9. Marian Gabriel MILI: *Contributions regarding the modernization of existing energetic units using the combined cycle steam-gas with parallel disposition*
10. Eng. Marian DOBRIN: *Contributions regarding the elaboration of a methodology of evaluation of technical and economic efficiency of energetic projects in the view of promoting the funding*
11. Eng. Ina Liliana VODISLAV (BLIDEA): *Contributions regarding the ecological utilization of the rubber waste*
7. Eng. Adina CÎRTOG: *Heat transport device with phase change, using one way parallel tubes*
8. Eng. Carmencita CONSTANTIN: *Contributions to the elaboration of a technical and economic strategy regarding the durable development of the urban heat generation sector*
9. Eng. Gavrilă TRIF-TORDAI: *Researches regarding the combined burning of combustible wastes with low quality coal*
10. Eng. Nicolae GIORGI: *Theoretical and experimental researches regarding the elaboration of the environment surveys for Tg. Jiu city*
11. Eng. Nicolae Stelian LONTIȘ: *Mechanical Engineering (Researches regarding the biodiesel as renewable fuel for small energy groups)*
12. Eng. Casian Petru BULZU: *Mechanical Engineering (Researches regarding the combustion with low concentration of CO₂)*
13. Eng. Dan Simion STEPAN: *Mechanical Engineering (Researches regarding the reduction of vibrations, noise in transportation /railway vehicles)*
14. Eng. Diana SILAGHI: *Researches regarding the utilization of solar energy*

PhD supervisor: Prof.dr.eng. habil Ioana Ionel

1. Eng. Adrian MAGDA: *Thermal and gasodynamic optimization study for the processes in the steam boilers, in view of reduction the fuel consumption and the level of pollutants*
2. Eng. Lucia VARGA: *Studies and researches regarding the air quality in Bihor county*
3. Eng. Aristică BABUCEA: *Studies and researches regarding the evaluation of dispersion of pollutant resulted from the combustion process in industrial thermal installations existing in Gorj county*
4. Eng. Claudiu GRUESCU: *Contributions to the ascertainment of combustion quality of wastes and methods of reduction of the pollutant emissions reduction*
5. Eng. Florin IACOBESCU: *Theoretical and experimental studies regarding the reduction of pollutants concentration for internal combustion engines and the study of the effects on air by applying novel technologies*
6. Eng. Adrian GOANȚĂ: *Theoretical and experimental researches regarding the thermal and gasodynamic processes from the combustion chambers*

RESEARCH TEAM

- Prof.dr.eng. Corneliu UNGUREANU
- Prof.dr.eng.habil Ioana IONEL
- Assoc.prof.dr.eng. Dan OPRISA-STANESCU
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- Eng. Adina CÎRTOG, PhD Student
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- Eng. Nicolae GIORGI, PhD Student
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Researches in ENHANCEMENT AND CONTROL OF HEAT AND MASS TRANSFER FOR THERMAL EQUIPMENTS AND ELECTRONIC COOLING, THERMAL NETWORKS

Keywords: *heat transfer enhancement, heat transfer control, magnetizable nanofluids, nanoscale systems, bubble dynamics, electronic equipment cooling, thermal network, heat exchangers, refrigerating machines, heat pumps, thermal phenomena*

ACTIVITIES

- researches regarding the optimisation of heat exchangers for vehicles
- theoretical studies concerning the heat transfer enhancement by means of numerical simulations
- researches regarding the mechanism of multi-phase heat transfer control by applying a magnetic field to a magnetizable nanofluid
- theoretical studies concerning the behaviour thermodynamic systems by molecular dynamics and Monte Carlo simulations
- electronic equipment cooling
- optimisation of urban thermal networks

RESULTS

RESEARCH CONTRACTS

1. Contract No. 219/01.02.2005, with SISTEM GAS SRL Timișoara, *Researches regarding the pressure losses on the liquefied petrol gas (LPG) path in autonomous systems*, Director: Prof.dr.eng. Mihai Nagi, value: 3,000 RON
2. Contract No. 331/05.10.2005, with SISTEM GAS SRL Timișoara, *Program to calculate the thermophysical properties of liquefied petrol*

gas (LPG), Director: Prof.dr.eng. Mihai Nagi, value: 1,000 RON

3. Contract No. 319/09.09.2005 with S.C. RAAL Bistrița, *Researches regarding the performances of shell type heat exchangers realised by S.C. RAAL Bistrița*, Director: Prof. dr.eng. Mihai Nagi, value: 8,000 RON
4. Contract No. 27688/ 14.03.2005, Theme 30, CNCISIS Code 665, *Researches regarding the utilization of magnetizable nanofluids as thermal fluid*, Director: Assoc.prof.dr.eng. Floriana D. Stoian, value: 15,000 RON
5. Contract No. 256/11.05.2005, with S.C. Coca Cola HBC Romania SRL, Timișoara, *The energy consumption in the heating and cooling systems from the factory S.C. Coca Cola HBC Romania SRL, Timișoara*, Director: Assoc. prof.dr.eng. Ioan LAZA, value: 4,140 RON
6. Contract No. 349/02.11.2005, with ISIM Timișoara, *The analysis of thermodynamic parameters in order to reduce the high temperature deformations of the final superheaters coils S3 and SI2*”, Director: Assoc.prof.dr.eng. Ioan LAZA, value: 27,000 RON
7. Contract No.202/10.01.2005, with ISIM Timișoara, *Study and methods of evaluation of the residual life duration of the boiler elements*, Director: Prof.dr.eng. Viorel SERBAN (Assoc.prof.dr.eng. Ioan LAZA, topic responsible), value: 1,454 RON

BOOKS

1. Mihai Nagi, Paul Ilieș, Vlad Marțian, *Designing and testing of radiators* (published in Romanian), Mirton Publishing House, Timișoara, 2005, ISBN 973-661-627-4, 104 pages
2. Mihai Nagi, Arina Speranța Negoiteșcu, *Laboratory testing of the thermal equipments* (published in Romanian), Mirton Publishing House, Timișoara, 2005, ISBN 973-661-662-2, 118 pages
3. Ioan Laza, *Refrigerating machines* (published in Romanian), Eurostampa Publishing House, Timișoara, 2005, ISBN 973-687-356-0, 200 pages

PUBLISHED PAPERS

1. Jădăneanț, M., Oancea, N., *Tabelarea mărimilor de stare și a transformărilor simple, reale în cazul amoniacului*, National Conference of Thermodynamics, XV edition, CD-ROM Proceedings, Craiova, ISBN 973-742-089-6

2. Nagi, M., Ilieș, P., Marțian, V., Alexandru, D., *New constructive solutions for noise attenuation on cooling systems for industrial machines*, Scientific Reunion of the Alexander von Humboldt Foundation concerning the Reconstruction of the Eastern Europe "Sustainability for Humanity & Environment in the Extended Connection Field Science-Economy-Policy", Politehnica Publishing House, Timișoara, 24-25 Febr., 2005, ISBN 973-625-205-1, pp. 141-144
3. Nagi, M., Herman, M., *Aspecte ale transmiterii căldurii în sistemul termodinamic primar pentru o descărcare singulară la prelucrarea prin eroziune complexă*, National Conference of Thermodynamics, XV edition, CD-ROM Proceedings, Craiova, ISBN 973-742-089-6
4. Nagi, M., Ilieș, P., Marțian, V., Alexandru, D., *Cercetări experimentale privind performanțele răcitoarelor combinate tip shell*, NAV-MAR-EDU-2005 with international participation, XIXth edition, June 2-4, 2005, "Mircea Cel Bătrân" Naval Academy Publishing House, CD-ROM Proceedings, Constanța, ISBN 973-8303-56-7
5. Nagi, M., Alexandru, D., *Cercetări experimentale privind variația parametrilor gazului petrolier lichefiat dintr-un rezervor de stocare*, NAV-MAR-EDU-2005 with international participation, XIXth edition, June 2-4, 2005, "Mircea Cel Bătrân" Naval Academy Publishing House, CD-ROM Proceedings, Constanța, ISBN 973-8303-56-7
6. Nagi, M., Ilieș, P., Marțian, V., *Researches for more compact cooling systems, for vehicles, done in Romania at RAAL Bistrita*, JUMV 20th International Congress, Belgrade, Serbia and Montenegro, European Automotive Congress, Session Ecology and Environment, CD presentation ISBN 86 80941-30-1, Print at DADA Belgrade, Publisher JUMV, 30.05-01.06 2005, Paper EAEC05YU-AQ04
7. Stoian, F.D., Holotescu, S., *Calculul unor proprietăți termodinamice ale bioxidului de carbon în stare supracritică prin metoda dinamicii moleculare*, Symposium "Man and the Environment", 4th edition, Timișoara, CD-ROM Proceedings, May 26, 2005, Politehnica Publishing House, ISBN 973-625-225-6, pp. 168-172
8. Stoian, F.D., Holotescu, S., *Considerații privind calculul coeficientului de auto-difuzie prin metoda Einstein*, National Conference of Thermodynamics, XV edition, CD-ROM Proceedings, Craiova, Section A, ISBN 973-742-089-6
9. Stoian, F.D., Pop, Gh., Vekas, L., Bica, M., *Cercetări experimentale privind transferul de căldură într-un nanofluid magnetizabil, la aplicarea unui câmp magnetic variabil*, National Conference of Thermodynamics, XV edition, CD-ROM Proceedings, Craiova, Section A, ISBN 973-742-089-6
10. Stoian, F.D., Pop, Gh., Vekas, L., Bica, D., *Ground-based experimental researches regarding the mechanism for controlling the nucleate boiling process in a magnetic nanofluid by an applied field*, Workshop on Magnetizable Nanofluids and Nanocomposites, Timișoara Academic Days, IXth edition, 26 May, 2005, Book of Abstracts
11. Lelea, D., *Some considerations on frictional losses evaluation of the water flow in microtubes*, International Communications in Heat and Mass Transfer, Vol. 32(7), 2005, ISSN 0735-1933, pp. 964 – 973
12. Lelea, D., *Numerical Heat Transfer and Fluid Flow in Microchannels, from Poiseuille to nowadays* (in Romanian), National Conference of Thermodynamics, XV edition, CD-ROM Proceedings, Craiova, Section A, ISBN 973-742-089-6
13. Mocuța, M., Jădăneanț, M., Mihon, D., *The settlements of European Union About Combustion Heaters for Motor Vehicles, Directive 2001/56*, Scientific Reunion of the Alexander von Humboldt Foundation concerning the Reconstruction of the Eastern Europe "Sustainability for Humanity & Environment in the Extended Connection Field Science-Economy-Policy", Politehnica Publishing House, Timișoara, 24-25 Febr., 2005, ISBN 973-625-205-1, pp. 60-67
14. Mihon, D., Pap, P., Jădăneanț, M., *Microsimulation Models Used for Traffic Optimization and Decreasing of Urban Pollution*, Scientific Reunion of the Alexander von Humboldt Foundation concerning the Reconstruction of the Eastern Europe "Sustainability for Humanity & Environment in the Extended Connection Field Science-Economy-Policy", Politehnica Publishing House, Timișoara, 24-25 Febr., 2005, ISBN 973-625-205-1, pp. 207-210
15. Oancea, Fl., Jădăneanț, M., *Problematica reabilitării termice a locuințelor din Timișoara*, National Conference with international participation "Installations for buildings and ambietal comfort", 14th edition, 14-15 April, 2005, ISBN 973-625-223-X, pp. 234-239
16. Moșteoru, L., Jădăneanț, M., *Utilizarea unui program de calcul în vederea determinării*

- structurii câmpului termic pentru diferite materiale izolatoare*, National Conference of Thermodynamics, XV editon, CD-ROM Proceedings, Craiova, ISBN 973-742-089-6
17. Mocuța, M., Jădăneanț, M., *Instalații de încălzire independentă a cabinei – o soluție de reducere a consumului de combustibil și a noxelor evacuate de autovehicule*, National Conference of Thermodynamics, XV edition, CD-ROM Proceedings, Craiova, ISBN 973-742-089-6
 18. Moșteoru, L., Jădăneanț, M., Moșteoru, Fl., *Teoria sterilizării instrumentarului medical cu aer cald uscat*, Symposium “Man and the Environment”, 4th edition, Timișoara, CD-ROM Proceedings, May 26, 2005, Politehnica Publishing House, ISBN 973-625-225-6, pp. 156-162
 19. Alexandru, D., Nagi, M., *Studiul variației parametrilor gazului petrolier lichefiat din rezervoarele de stocare*, National Conference of Thermodynamics, XV edition, CD-ROM Proceedings, Craiova, ISBN 973-742-089-6
 20. Motantau, D., Nagi, M., Stanciu, T., *Modelarea transferului de caldura in regim laminar prin tubul simplu*, National Conference of Thermodynamics, XV edition, CD-ROM Proceedings, Craiova, ISBN 973-742-089-6
 21. Herman, M., Nagi, M., *Măsurarea temperaturii în sistemul termodinamic primar la prelucrarea prin eroziune complexă*, National Conference of Thermodynamics, XV edition, CD-ROM Proceedings, Craiova, ISBN 973-742-089-6
 22. Ilieș, P., Marțian, V., Nagi, M., *Soluii constructive moderne de schimbatoare de caldura compacte din aluminiu*, National Conference of Thermodynamics, XV edition, CD-ROM Proceedings, Craiova, ISBN 973-742-089-6
 23. Saftoiu, O., Nagi, M., *Influența creșterii temperaturii de intrare a apei de răcire in condensatorul turbinei de 330 MW asupra presiunii de condensare și a puterii termice*, Xth Scientific Conference with international participation, organised by University “C. Brâncuși” Tg. Jiu, 4-5 Nov. 2005, Conference Proceedings, CD-ROM Edition.
 24. Ilieș, P., Marțian, V., Nagi, M., *Influenta dimensiunii nervurilor asupra performantelor radiatoarelor din aluminiu*, Xth Scientific Conference with international participation, organised by University “C. Brâncuși” Tg. Jiu, 4-5 Nov. 2005, Conference Proceedings, CD-ROM Edition.
 25. Sporea, M., Nagi, M., Sporea, I., *The use of the heat exchangers of tubular type*, Xth Scientific Conference with international participation, organised by University “C. Brâncuși” Tg. Jiu, 4-5 Nov. 2005, Conference Proceedings, CD-ROM Edition.
- PhD THESIS**
1. Eng. Ion ALMĂȘAN, *Studies and researches regarding the radial ejectors*, PhD supervisor: Prof.dr.eng. Gavril CREȚA
 2. Eng. Dan ALEXANDRU, *Contributions to the study of the use of liquefied petrol gases in autonomous systems*, PhD supervisor: Prof.dr.eng. Mihai NAGI
- OTHER RESULTS**
- Assist. eng. Virgil Stoica – Associate researcher at the Department of Thermodynamics, Technical University of Darmstadt, Germany, Jan. 2004 – April 2006, Topic: *Interferometric Measurement of Temperature Profiles in Boiling Fluids*.
- PhD STUDENTS**
- PhD supervisor: Prof.dr.eng. Mihai NAGI*
1. Eng. Cătălin BOJAN: *Researches regarding the use of shell type tubes for the construction of compact heat exchangers*
 2. Eng. Ovidiu SAFOIU: *Studies and researches regarding the optimisation of the main steam condenser operation for the 350 MW steam turbine, in the conditions of the variation of the cooling fluid parameters*
 3. Eng. Ciprian CAIA: *Studies and researches regarding the correlation between the intake air in a direct injection compression ignition engine, the engine performances and the pollution level*
 4. Eng. Tiberiu STANCIU: *Researches regarding the use of shell type of tubes for the construction of compact heat exchangers*
 5. Eng. Mihaela BUCULEI, *Studies and researches regarding the installations of unconventional liquid fuel preparation for use in compression ignition engine with direct injection*
 6. Eng. Paul ILIES: *Constructive and operational optimization of the aluminum heat exchangers manufactured at S.C. RAAL S.A. Bistrita*
 7. Eng. Francisc SZIKSZAI: *The control and enhancement of heat transfer in magnetizable nanofluids*
 8. Eng. Mariela Augusta SPOREA: *Studies and researches regarding the recovery of exhaust gases from the cupola furnace*

PhD supervisor: Prof.dr.eng. Mihai JĂDĂNEANȚ

1. Eng. Liliana Daniela MOSTEORU: *Contributions to the improvement of thermal performances and ecologisation of the sterilisation equipment for medical instruments*
2. Eng. Cristian DAMIAN: *Contributions to the thermal study of the axle boxes with rolling bearing at high speed trains*
3. Eng. Sorin RUSU: *Contributions to the optimisation of the railroad traction diesel engines operation*
4. Eng. Gh.-Florin OANCEA: *Theoretical and experimental contributions regarding the thermal rehabilitation of the buildings from a headquarter in Timișoara city*
5. Eng. Doina MIHON: *Theoretical and experimental contributions regarding the optimisation of the transportation fluxes in view of reducing the pollutants produced by the vehicles driven by internal combustion engines*
6. Eng. Gh. Marcel MOCUTA: *Theoretical and experimental contributions regarding the combustion and the heat exchange in the hot air generators used on road vehicles*
7. Eng. Constantin STROIE: *Contributions to the study of the impact of railroad transportation on the environment and the railroad infrastructure*
8. Eng. Laurențiu CĂLIN, *Industrial Engineering*
9. Eng. Florin MĂRCUȚ, *Industrial Engineering*

PhD supervisor: Prof.dr.eng. Gavril CREȚA

1. Eng. Ion Cornel LUPUT: *Researches regarding the possibility of reduction the fuel consumption in large cities around the country, with reference to Timisoara city*

RESEARCH TEAM

- Prof.dr.eng. Mihai NAGI
- Prof.dr.eng. Mihai JĂDĂNEANȚ
- Prof.dr.eng. Gavril CREȚA
- Assoc.prof.dr.eng. Floriana D. STOIAN
- Assoc.prof.dr.eng. Liviu MIHON
- Assoc.prof.dr.eng. Ioan LAZA
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- Eng. Vlad MARȚIAN, PhD Student
- Eng. D. ALEXANDRU, PhD Student
- Eng. Mariela SPOREA, PhD Student
- Eng. Francisc SZIKSZAI, PhD Student
- Eng. Cătălin BOJAN, PhD Student
- Eng. Ovidiu SAFTOIU, PhD Student

- Eng. Ciprian CAIA, PhD Student
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- Eng. Sorin RUSU, PhD Student
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Researches in DETERMINATION OF COMBUSTIBLE AND ENERGY CONSUMPTION AT TRAINS TOW WITH DIESEL OR ELECTRIC LOCOMOTIVES

Keywords: railway traction, traction estimation, combustibile and electric energy consumption, energy saving, pollution

ACTIVITIES

- Determination of combustibile and electric energy consumption and the influences of parameters like: line's profile, constructive and functional characteristics of locomotives and wagons, train driving type and stile, heading resistance and others
- Elaboration the solving methodology for train's movement equation by using Runge-Kutta integration method
- Elaboration of a computer code for traction calculation and combustibile and energy consumption estimation

RESULTS

RESEARCH CONTRACTS

CNCSIS grant, A type, Code 548, Contr. Nr. 32940 - 22.06.2004, *Researches Regarding Constructive-Functional Optimization and the Ecologisation of Thermal Equipment and Machines and Transport Vehicles*, Director: Prof.dr.eng. Virgiliu Dan Negrea, theme for 2005: *Studies and Researches Regarding the Optimization of Locomotives'*

Driving in Train Towing, with the Purpose of Reducing Combustible Consume and Electric Energy, value 15,000 RON

BOOKS

Georgeta Emilia Mocuța, *Railway Informatics and Cybernetics*, (published in Romanian), Cybernetics Collection, Politehnica Publishing House, Timișoara, 2005, ISBN 973-625-273-6, 156 pages

PUBLISHED PAPERS

- Ghita, E., *A finite element analysis about the state of stress in railway wheels*, 5th National Multidisciplinary Conference "Prof. Dorin Pavel – founder of the Romanian Hydroenergetics", 20-22 May, 2005, Sebes, Romania, ISBN 973-8130-82-4, pp. 567-570
- Ghita, E., Ghita, D., *The magnetic levitation of high speed trains - a challenge of the future railway transportation*, Int. Conference "Sustainability for humanity & environment in the extended connection field science-economy-policy", 24-25 Febr., 2005, Timișoara, ISBN 973-625-206-x, pp. 113-116
- Dungan, M., Dungan, L.I., *Researches about the level of noise into the driver's cab of diesel locomotives for use in Romania*, International Conference "Sustainability for humanity & environment in the extended connection field science-economy-policy", 24-25 Febr., 2005, Timișoara, ISBN 973-625-205-1, pp. 99-103
- Turos, G., Dungan, M.C., Pap, P., Ursu, N.V., *Determination of characteristics for tractive force and efficiency at the perimeter of the drive wheel, for diesel hydraulic locomotive's for every position of command controller*, 19th International Scientific Conference "NAV-MAR-EDU 2005", June 2005, Constanta, Romania, CD-ROM, pp. 527-535
- Turos, G., Ursu, N.V., *Determination of tractive electric motors randament in D.C./R.C. depending on own functional regime*, 19th International Scientific Conference "NAV-MAR-EDU 2005", June 2005, Constanta, Romania, CD-ROM, pp. 535-543
- Dungan, M.C., Dungan, L.I., *Thermal confort in passenger railway transport*, 19th International Scientific Conference "NAV-MAR-EDU 2005", June 2005, Constanta, Romania, CD-ROM, pp. 265-273
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14. Herman, M., Herman, R., *L'aplication du concept systemique a l'evaluation qualitative et quantitative du proces d'usinage par erosion complexe*, International conference „Modern Technologies. Quality. Restructuring”, Technical University of Moldavia, Chişinău, May, 2005, Vol. 2, ISBN 9975-9875-5-9, pp. 97-100

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- Assist.eng. Gabriel URUSU, PhD student
- Assist.eng. Luiza-Izabel DUNGAN
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Researches in SCIENTIFIC INVESTIGATION OF ECONOMIC AGENTS REGARDING THE OPPORTUNITY AND DEVELOPMENT OF RO-LA TRANSPORT SYSTEMS

Keywords: *multimodal transport, intermodal freight terminals, RO – LA transport, FERRY – BOAT, containers special train, railway conveyance of material, economic agents.*

ACTIVITIES

- investigation of the enterprises in the region of the activity of ”C.F.R. Marfă - S.A.” Timișoara, regarding the utilization of multimodal transport, like RO - LA transport, FERRY - BOAT and containers special train
- analysis of the transport types with respect to conveyance of material, quantity, periods of time, transports relations, etc

RESULTS

BOOKS

Dungan, L.I., Dungan, M.C., Solea, E., *Commercial exploitation of railway*, (published in Romanian),

Mirton Publishing House, Timișoara, 2005, ISBN 973-661-611-8, 113 pages

PUBLISHED PAPERS

1. Pap, P., Mihon, D., Jădăneanț, M., Mocuța, M., *Pasenger urban transport services marketing's optimization for urban pollution decreasing*, International Conference “Sustainability for humanity & environment in the extended connection field science-economy-policy”, 24-25 Febr., 2005, Timisoara, ISBN 973-625-205-1, pp. 385-389
2. Mihon, D., Pap, P., Jădăneanț, M., Mocuța, M., *Microsimulation models used for traffic optimization and decreasing of urban pollution*, International Conference “Sustainability for humanity & environment in the extended connection field science-economy-policy”, 24-25 Febr., 2005, Timisoara, ISBN 973-625-206-x, pp. 207-211
3. Ghita, E., *The state of the art in the rehabilitation of a pionner crane*, 7th International symposium Young people and multidisciplinary research, 20-21 Sept. 2005, Reșița, Romania, CD-ROM, 6 pages
4. Ghita, E., *Rolling bridge – transportation system*, National student symposium “HD-35-STUD”, 13-14 May, 2005, Hunedoara, Romania, CD-ROM, 4 pages
5. Gherasimov, A., Ghita, E., *The traceability system of force measurements in Romania*, 19th International conference: Force, mass and torque measurement, Theory and applications in laboratories, 21-23 Febr., 2005, Cairo, Egypt, CD-ROM, pp. 46-47

RESEARCH TEAM

- Prof. dr. eng. Mircea Corneliu DUNGAN
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- Lect. dr. eng. Mihaela HERMAN
- Assist. eng. Gabriel URUSU, PhD student
- Assist. eng. Luiza-Izabel DUNGAN
- Radu Mihai PANTILE, graduate student

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RESEARCH CENTER IN STRENGTH OF MATERIALS AND SAFETY OF MECHANICAL STRUCTURES, CABLES AND CONDUCTORS

RESEARCH AREAS

- Fatigue and Fracture Mechanics
- Behaviour of composite materials at static loading and fatigue, cracking mechanism, plates behaviour at dynamic loading
- Life-time prolongation of steels at high temperatures
- Accuracy of solutions involved in the stress calculus of curved specimens
- Physical properties of aluminium, steel-aluminium and steel conductors
- Wire and wire ropes and round steel chains
- High temperature behaviour of steels, stability and creep of long vertical pipes, curved beams stress analysis
- Analysis and tests about behaviour of materials belonging of heavy devices being out of working life-time



KEYWORDS

Wohler's curve, fatigue crack propagation, crack closure, displacement at crack opening, computer tests, life – time, fracture tenacity, stress intensity coefficient K_{IC} , J – integral, fatigue at variable deformation, cumulative degradation at variable loading, macroscopically aspects at fatigue fracture, dynamic fatigue, safety and risk, probabilistical aspects of fatigue and fracture mechanics, defects toleration, conductors, stress, strain, modulus of elasticity, creep, ambient temperature, thermal properties, thermoelasticity, thermal fatigue, fracture, pipes under pressure, composite materials, fatigue, dynamical, loads, composite plates.

FIELD DESCRIPTION

Endurance of Steel wire ropes and round steel chains, service and fatigue life, stress - strain,

bending, ropes and chains for cranes and other hoisting or transporting machines.

Stress - Strain Test. Curves` equations for initial composite, steel and aluminum, final composite, steel and aluminium.

Studies concerning the life-time prolongation of steels at high temperatures, studies about the accuracy of solutions involved in the stress calculus of curved specimens. Researches can be used by electrotechnical materials industry and distributing electrical energy units. There are also useful in order to participate to international auctions.

Studies concerning the behaviour of composite materials at static loading and fatigue, cracking mechanism, plates behaviour at dynamic loading.

There is analysed the influence of working life-time of different types of steel belonging, of minning equipments being out of working life-time. There were performed some researches regarding the behavior at variable loads, impacts and also fracture mechanics analysis.

Creep at ambient temperature tests of aluminium and steel-aluminium conductors in order to certify their quality. The loading and unloading behaviours are described by typical diagrams and equations of curves have been estimated. Experimental researches were performed at ambiantal and results were extrapolated beginning 100 or 1000 hours to 10000 hours.

ACTIVITIES

- The life – time estimation of some strength elements (wire ropes, links, springs, etc) at imposed loading levels
- The strength at fatigue estimation of some steel and welded elements
- The analysis of the influence of simulated defects about the fatigue strength at welded elements
- The estimation of K_{IC} and J_{IC} for some machine parts steels
- The estimation of the dynamic tenacity coefficients K_{Idc} and J_{Idc}
- The analysis of crack propagation at cyclic loading and under repeated shocks
- Estimation of mechanical characteristics obtained at variable loads
- Computer programme analysis for durability of a bar belonging to a heavy minning machine, by using fracture mechanics theory
- Design devices for hanging cracking pipes

- Theoretical and experimental studies of vertical long specimens under compressive loading also into account thermal effects.

RESEARCH TEAM

- Prof.dr.eng. Nicolae NEGUȚ
- Prof.dr.eng. Ion DUMITRU
- Prof.dr.eng. Nicolae FAUR
- Prof.dr.eng. Pavel TRIPA
- Prof.dr.eng. Josif HAJDU
- Prof.dr.eng. Tiberiu BABEU
- Prof.dr.eng. Ionel DOBRE
- Prof.dr.eng. Constantin CRISTUINEA
- Assoc.prof.dr.eng. Dana SILAGHI PERJU
- Assoc.prof.dr.eng. Liviu MARȘAVINA
- Assoc.prof.dr.eng. Liliana BLAJ
- Lect.dr.eng. Marcela SAVA
- Lect.dr.eng. Mihai HLUȘCU
- Lect.dr.eng. Nicolaie CIOBOTARU
- Assist.eng. Iuliu SISAK
- Assist.eng. Radu NEGRU
- Dr.eng. Mihaela POPESCU
- Eng. Herman SEGAL
- Eng. Laurentiu CULEA
- Eng. Claudia SECRIERU
- Eng. Maria SECHEI

RESEARCH OFFERS

Bending endurance testing, Tensile fatigue testing, Experimental stress analysis, Fatigue prediction, Research on wires, Standards (ISO-TC 85), Stress-strain, Breaking test, Creep at ambient temperature test for 6 month, 1 year, 10 years creep;

Study – test for composite materials, Stress concentration and fatigue, Composite materials structures computation;

Expert study of equipment for heavy machines with expired life-time, Fracture mechanics testing, Fatigue with impact, Non-destructive testing;

High Temperature Study of Creep Properties, Theoretical Analysis and Creep Computation for pipes Stability and Creep for vertical long pipes

RESEARCH CONTRACTS

1. AMTRANS X1C07-03.10.2005, Acronyme RCTUM, *Multiple user research network for technologies processes and technical equipment from the following branches: machine construction, agriculture and food industry*; Director: Faur Nicolae, Value: 20,000 RON
2. AGRAL 22-05.10.2005, Acronim: MEFCOM, *Complex research concerning the use of the finite element analysis in studying the artificial compression of soil under the action of drive trains in tractors and agricultural equipment*, Director: Faur Nicolae, Value: 10,000 RON

3. Nr. 057/03.10.2005, *The exoneration of the soil using intensive proceedings from the zones of exploration and manufacture of radioactive minerals, in states of natural catastrophes or antropic accidents*, Director: Jinescu A., Value 3,000 RON
4. Nr: 45/2005, *Compression Tests on Packing Cartons for the Perfusion Solutions*, Director: Nicolae Faur, Beneficiary: HELVETICA PROFARM SA, Timișoara, Value: 8,000 RON
5. Nr. 212 / 2005, *Analysis of Thecthinal Solution for Electrical Motor Type C*, Director: Liviu Marsavina, Beneficiary: S. C. UCM S.A. Reșița, Value: 3,000 RON
6. Nr. 366 / 2005, *Study of Crack Propagation in Transversal Support of the 95 mc Vessel Tank*, Director: Liviu Marsavina, Beneficiary: S.C ASTRA Vagoane S.A Arad, Value: 6,480 RON
7. Code 625 CNCISIS, Grant A 27688 / 14.03.2005, Theme nr. 23, *Simulation and optimal operation with advanced management systems of research and laboratory installations from chemical industry*, Director: Perju Delia, Value for 2005: 20,000 RON
8. Code 13 CNCISIS/2005, *Creep Researches and Studies on Al and Ol Conductors used in Electrical Energy Transport Networks*, Director: Faur Nicolae, Value: 15,000 RON
9. C18014/2005, *Numerical Simulation of the Influence of Crack Formation on Chloride Penetration in Reinforced Concrete*, University Ghent, Coordinator: Assoc.prof.dr.eng. L. Marsavina, Value: 58,500 EUR
10. Leonardo da Vinci Program, R0 / 2004 / 93004 / Ex, *Implementation of Modern Methods of Training in Solid Mechanics Field*, Promoter: Assoc.prof.dr.eng. L. Marsavina, Value for 2005: 7,500 EUR
11. Theme 17, Code CNCISIS 177 / 2005, *Implementation of Probabilistic Methods in Fracture Mechanics*, CNCISIS grant type A, Director: Assoc.prof.dr.eng. L. Marsavina, Value: 15,800 RON

PUBLICATIONS

BOOKS

Faur, N., *Mechanics of Materials*, Politehnica Publishing House, Timisoara, ISBN 973-625-011-3, 300 pages

PAPERS

1. Marsavina, L., Nurse, A.D., *Asymptotic Stress Field for Free Edge Joints Under Small Scale Yielding Conditions*, 11th International Congress of Fracture, CD ROM Proceedings,

- 4306, Torino, Italy, 2005, ISBN 973-651-918-X, pp. 445-451
2. Marsavina, L., Estrada, R., *High Frequency Thermoelastic Stress Assessment*, Proceedings XIth International Conference on Vibration Engineering, Timisoara, 2005, ISSN 1224-6077, pp. 319 – 324
 3. Marsavina, L., Tomlinson, R., *Thermoelastic Methodology for Structural Integrity Assessment*, CD-ROM Proceedings of the 9th International Fracture Mechanics Summer School, Varna, Bulgaria, 2005, ISBN 3-901509-29-6, pp. 231-237
 4. Faur, N., Marsavina, L., Negru, R., *Automatic Acquisition and Processing Dates of Materials Testing and Strengths of Structures*, Sebes 21-23 May, 2005, in Science and Engineering, AGIR, vol. 7, ISBN 973-8130-82-4, ISBN 973-720-015-2, pp. 539-544
 5. Negut, N., Faur, N., Hajdu, J., Marsavina, L., Hluscu, M., Culea, L., *Determination of Stiffness Characteristics for Helicoidal Torsion Springs*, Sebes, 21-23 May, 2005, in Science and Engineering, AGIR, vol. 7, ISBN 973-8130-82-4, ISBN 973-720-015-2, pp. 545-550
 6. Dumitru, I., Marsavina, L., Faur, N., *A Proposal Regarding the loading Conditions at the Stress-Strain Tests of Steel- Aluminium Conductors Core*, Proceedings 4th DAAAM - Advanced Technologies for Developing Countries, Sept. 21-24, 2005, Slavonski Brod, Croatia, ISBN 953-6048-29-9, ISBN 3-901509-49-6, pp. 243-248
 7. Faur, N., Marsavina, L., Culea, L., *Determination of Stiffness Characteristics for Coiled Torsion Spring*, Proceedings 4th DAAAM - Advanced Technologies for Developing Countries, Sept. 21-24, 2005, Slavonski Brod, Croatia, ISBN 953-6048-29-9, ISBN 3-901509-49-6, pp. 257-260
 8. Fleser, C., Faur, N., Fleser, T., *Numerical Consideration of Periodontal Reactions in Orthodontic Treatment*, Nonconventional Technologies Journal, No.4 / 2005, ISBN 1454-3087, pp. 93-96
 9. Tripa, P., Hluscu, M., *The estimation of lifetime of a cracked steam pipe under an internal loading pressure*, 5th National Conference “Professor Dorin Pavel – Founder of Romanian Hydroenergetics”, Sebes, 2005, in Science and Engineering, AGIR, Bucharest, 2005, vol. 7, ISBN 973-8130-82-4, ISBN 973-720-015-2, pp. 625-630
 10. Hluscu, M., Tripa, P., *Creep behaviour of the tubes from a cracking reactor for methane gas*, 5th National Conference “Professor Dorin Pavel – Founder of Romanian Hydroenergetics”, Sebes, 2005, in Science and Engineering, AGIR, Bucharest, 2005, vol. 7, ISBN 973-8130-82-4, ISBN 973-720-015-2, pp. 631-636

PERSPECTIVES

The researches in the fields of fatigue and fracture mechanics present a topical interest. The implementation of new equipments in the laboratory of fatigue and fracture mechanics and the inclusion of the laboratory as a part of the National Research Center in Construction and Fatigue, BCUM, code CNC SIS 19, will allow the extension of the researches to new directions and will offer the opportunity to solve any request in this field.

A special attention will be granted to new materials, and also to traditional materials with unknown mechanical characteristics regarding the fatigue behaviour.

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RESEARCH GROUP IN *ROBOTICS*

RESEARCH FIELDS

Trajectory generation and motion planning are major problems in the creation of autonomous robots. These problems interact with other important problems, including geometric, kinematic and dynamic modeling, real-time motion control, sensing and task planning. Workspace modelling offers knowledge about the environment where the robot has to accomplish its task.

KEYWORDS

Robot, modeling, path planning, motion generation, trajectory, workspace

ACTIVITIES

Robot's mechanics, dynamic modeling, robot path planning, robot motion generation, workspace modeling, robot-workspace complex system modeling.

PROJECTS

Contract 32940/22.06.2004, Theme 29, CNCIS code 198, *Knowledge based system for developing of assisted learning technology*, Value for 2005: 18400 RON

PUBLICATIONS

Drăgulescu, D, Stoicănescu, C., Crețu, A.M, Toth-Tașcău, M, Dreucean, M, *Utilitarian Robots Acting in a Virtual Medical Center Scene*, IMTC/05

Proceedings of the IEEE Instrumentation and Measurement Technology Conference, Ottawa, Ontario, Canada, 16-19 May, 2005, ISBN 0-7803-8879, pp. 1373-1377

PERSPECTIVES

Modelling of a vehicle-workspace system, in order to optimize the typical activities, will allow experiments using virtual spaces, created by the user, available for any application, reducing the cost price and allowing an assisted learning both in education and healthcare.

RESEARCH TEAM

- Prof.dr.eng. Doina Drăgulescu,
- Prof.dr.eng. Mirela Toth-Tașcău,
- Assoc.prof.dr.eng. Mircea Dreucean,
- Eng. Lucian Rusu, PhD student

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RESEARCH GROUP IN *MECHANICS AND VIBRATIONS OF TEXTILE MACHINES*

RESEARCH FIELDS

- Study of acoustic field (noise level, frequency spectra) of weaving machines
- Study of dynamics of motion of knitting machines

KEYWORDS

Vibrations, weaving machine, knitting machine

ACTIVITIES

- Experimental determinations of vibration and noise level
- Modelling of mechanisms of weaving machines
- Study of dynamics of knitting machines

RESULTS

- Determination of resonance angular vibrations of rotary knitting machines
- Determination of acoustic field of weaving-mills and elaboration of methods of reduction of the noxious effects

PUBLICATIONS

1. Chiriac, A., Uroșu, D., *On the Dynamics of Motion of a Rotary Knitting Machine*, Scientific Bulletin of the "Politehnica" University of Timișoara, Tom 50(64), Special Issue, 2005, ISSN 1224-6077, pp. 225-228
2. Vigar, C., *Noise Emitted by Weaving Machine Measurement*, Scientific Bulletin of

the "Politehnica" University of Timișoara, Tom 50(64), Special Issue, 2005, ISSN 1224-6077, pp. 215-218

RESEARCH TEAM

- Prof.dr.eng. Adrian Chiriac
- Lect.dr.eng. Gheorghe Luca
- Assist.eng. Cosmina Vișaru
- Eng. Adriana Baltă, PhD student
- Assoc.prof.dr.eng. Nicolae Herișanu

PERSPECTIVES

- Study of vibrations and noises at knitting machines

- Experimental determinations concerning the level of vibrations at classical weaving machines and new generations of weaving machines

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RESEARCH GROUPS IN THE DEPARTMENT OF DESCRIPTIVE GEOMETRY AND ENGINEERING GRAPHICS

Researches in *THE PARAMETRIC MODELLING IN ACCORDANCE TO THE ISO STANDARDS "STEP" AND "PLIB" USED FOR MODEL DESCRIPTION AND EXCHANGE OF PRODUCT DATA*

KEYWORDS: ISO standardization, products

FIELD DESCRIPTION

The research theme will develop the necessary knowledge base and create appropriate conditions for the implementation in the Romanian industry of the current ISO elements regarding a unitary, standardized description and exchange of the product model data, starting from the design stage, and continuing all along the product life cycle. The research team aims to aware the Romanian economical environment about the necessity of a continuous adjustment to the world market and the concurrence requirements in manufacturing and selling industrial products. The team will cooperate with the Romanian National Standardizing Authority in adopting and applying the "STEP" and "PLIB" ISO standards.

RESEARCH TEAM

- Prof.dr.eng. Lia DOLGA
- Assist.eng. Mihai REVCU
- Lect.dr.eng. Doina SAFTENCU
- Assist.eng. Marian DĂNĂIAȚĂ
- Eng. Marius SUMEDREA, master student
- Eng. Bene SANDOR, master student

ACTIVITIES AND RESULTS

- The parametric and feature-based modelling it is the main subject of the discipline "The ISO modelling of the advanced mechanical

systems", taught to the students of the master specialization *Computer Aided Design of the Advanced Mechanical Systems*. The applications were realized in the MDT and Inventor and CATIA design environments.

- A special chapter regarding the STEP and PLIB standards was created within the course.
- The problem regarding the importance of ISO standards was broadly developed at the disciplines taught by the team members.
- A debate about the STEP and STEP-NC standards was organized with the master students in CAD specialization. A master dissertation was sustained in 2005, new themes were initiated for the academic year 2005-2006 including appropriate STEP subjects.
- The Romanian National Standardizing Authority was contacted in order to propose the adoption of the STEP and PLIB standards in Romania.

Researches in *E-LEARNING IN COMPUTER AIDED DESIGN*

KEYWORDS

Interactive educational instruments, CAD technique

FIELD DESCRIPTION

The main goal of this program consists in creating and developing more adaptive and flexible educational instruments. New interactive learning and teaching methods were studied and experimented. Based on the integration of the individual instructional methods and the group training procedures, more software packages were developed to help students of different ages in learning CAD techniques.

RESEARCH TEAM

- Prof.dr.eng. Lia DOLGA
- Assist.eng. Mihai REVENCU
- Eng. Ovidiu MOLDOVAN, master student
- Eng. Remus CĂIMAN, master student

ACTIVITIES AND RESULTS

- The electronic support was developed for the CAD disciplines taught by the team members to be used in the Intranet and Internet networks
- Some team members graduated a training course organized by SIVICO and became AEL instructors, within the SEI project regarding the Development of the Romanian Education System.

Researches in NEW METHODS, PROCEDURES AND PROGRAMS TO EDUCATE THE THREE-DIMENSIONAL VISION OF THE STUDENTS

KEYWORDS

Descriptive geometry, 3D vision, technical representation

FIELD DESCRIPTION

Beginning from the first study year, the preoccupation to develop the 3-dimensional vision holds a principal function, because of its importance in training many other engineering disciplines. The education of the student's 3D vision is a complex and long-standing process and needs many exercises, diversified methods, ample teaching experience. The activity uses descriptive geometry methods and representations to develop the space vision and the ability to imagine and understand three-dimensional objects. New methods were developed to test students' abilities in imaging and representing different technical parts.

RESEARCH TEAM

- Prof.dr.eng. Iulia VOIA
- Prof.dr.eng. Lia DOLGA
- Assoc.prof.dr.eng. Mircea VODA
- Lect.dr.eng. Mihaela CRETU-NICA
- Lect.dr.eng. Doina SAFTENCU
- Lect.dr.eng. Arseniu PECICAN
- Assist.eng. Ileana MLADIN
- Assist.eng. Petrica M. DANAIATA
- Assist.eng. Silviu DUMITRAS
- Assist.eng. Mariana ILIE
- Assist.eng. Mihai REVENCU
- Assist.eng. Ladislau WALKOVSKY

ACTIVITIES AND RESULTS

- More departments' members participated to the International Conference on Engineering Graphics and Design, ICEGD 2005, Bucharest, 9-10 June 2005

- X-th student professional contest "Student CAD" was organized in January, oriented on the 2D AutoCAD graphics. In May a second one was organized, oriented on 3D Modeling and Parametric Design in Inventor Environment and CATIA Environment
- A initiation presentation 3D Modeling for the Mechanic Engineering profile was organized in co-operation with AutoDesk Center assignee from the UST Lille during the month of November 2005

Researches in THE DEVELOPMENT OF THE PARAMETRIC MODELS IN RELIABILITY OF MECANIC COMPONENTS

FIELD DESCRIPTION

The main goal of this program consists in modeling of the mechanical parameters dependence in comportment of machines during the exploitation using the CAD and FEM techniques to develop the specific software packages in this field.

KEYWORDS

Modeling software, CAD, FEM

RESEARCH TEAM

- Assoc.prof.dr.eng. Mircea VODA
- Prof.dr.eng. Viorel A.SERBAN
- Assoc.prof.dr.eng. Ilare BORDEASU
- Prof.dr.eng. Lia DOLGA
- Assist.eng. Marian DĂNĂIAȚĂ
- Eng. Adriana BACILA, PhD student

ACTIVITIES AND RESULTS

- The co-operation accord with the Mechanic Laboratory of Lille, France, in the field of *Study and modeling fatigue* was pursued.
- Financing for PhD study was obtained from ALSTOM, France, for eng. Adriana Bacila, having as a subject the *Crack simulations system for am metallic elements under a charge*
- A poster was presented in the *International Congress of Nanotechnology*, San Francisco, October 31 – November 4, 2005 by Voda, Mesmacque, Bordeaux, Serban

PUBLICATIONS
PUBLISHED PAPERS

1. Saftencu, D., Danaiaata, M.P., *Applying textures on virtual models with solidworks*, Proceedings of the International Conference on Engineering Graphics and Design, ICEGD 2005, Bucharest, 9-10 June 2005, BREN Publ., Bucharest, 2005, ISBN 973-648-471-8, pp. 125-128
2. Saftencu, D., Danaiaata, M.P., *Working with standard parts library in solidworks in designing mechatronics products*, Proceedings

- of the International Conference on Engineering Graphics and Design, ICEGD 2005, Bucharest, 9-10 June 2005, BREN Publ., Bucharest, 2005, ISBN 973-648-471-8, pp. 29-32
3. Saftencu, D., Pecican, A.H., *Descriptive geometry - from fundamentals to 3D objects or backward?*, Proceedings of the International Conference on Engineering Graphics and Design, ICEGD 2005, Bucharest, 9-10 June 2005, BREN Publ., Bucharest, 2005, ISBN 973-648-471-8, pp. 505-508
 4. Ilie, M., Kneip, J.C., Mattei, S., *Effects of laser beam scattering on through transmission welding of polymers*, Proceedings of the 24th International Congress on Applications of Lasers and Electrono-Optics, Icaleo, Nov. 2005, Miami, pp. 133 -139
 5. Voda, M., Mesmacque, G., Bordeasu, I., Serban, V.A., *Influence de la fatigue sur l'érosion de la cavitation pour un acier inoxydable martensitique*, Actes du Congres JISPME, 1-3 Dec. 2005, Toseur, Tunis, pp. 56-64

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